

AUTOMOTIVE INDUSTRIES

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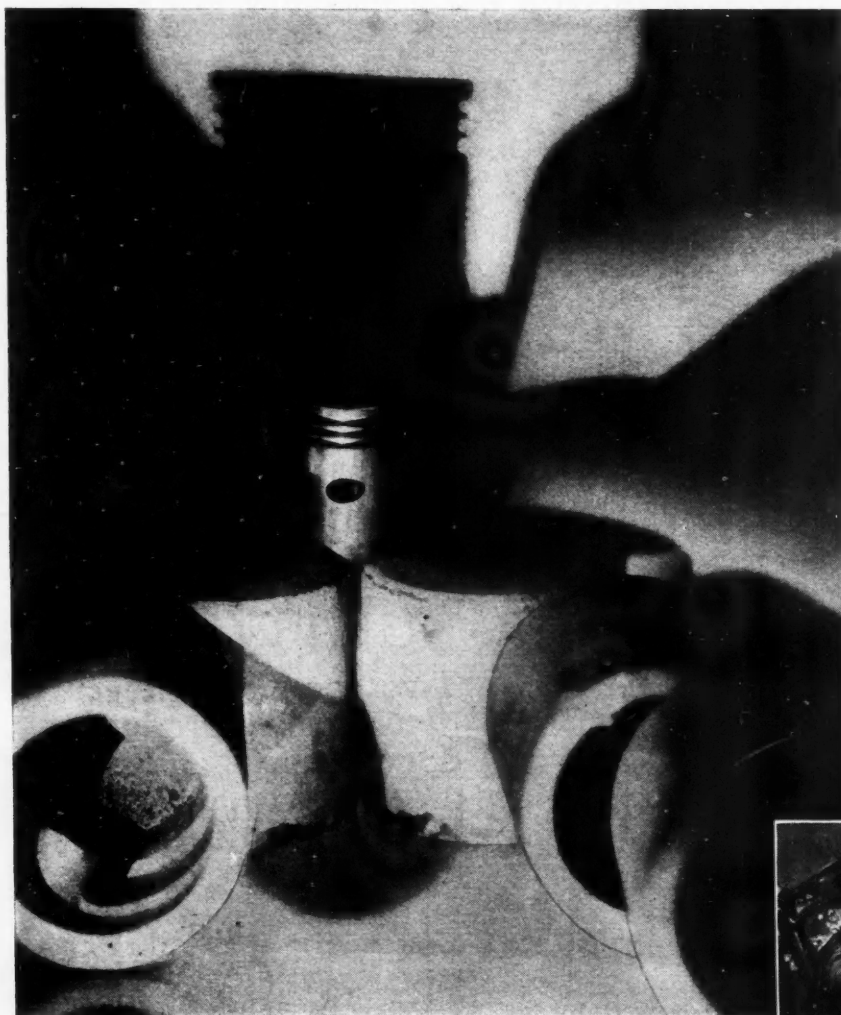
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October 25, 1930



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(Below) Harley-Davidson "74"
motor showing Nickel Cast Iron
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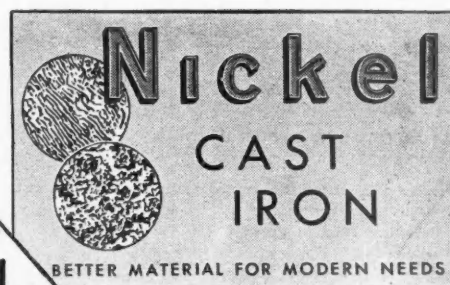
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THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

AUTOMOTIVE INDUSTRIES

VOLUME 63

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NUMBER 17

British Offer 21 Models With 4-Speed Silent Transmissions at Olympia

By M. W. Bourdon

Special Cable to
Automotive Industries

EXHIBITS at the Olympia Passenger Car Show—which opened on Thursday of last week—indicate that British manufacturers again anticipate no appreciable domestic demand for cars with more than six cylinders. Of the 19 new British models shown, three have engines with four cylinders, thirteen with six, one with eight, and two with twelve. The latter are Daimler cars with engines of 320 and 396 cu. in. displacement, both taking the places of previous twelves. The eight is a Hillman of the same size as the previous model. Of the sixes, some are smaller and some are larger than superseded models, the smallest being a 77-cu. in. Triumph with a miniature four-passenger sedan body selling at £237 and a 77-cu. in. Wolseley selling at £185. The largest is a Bentley of 488 cu. in. displacement, this being the highest powered British stock car at present. The new fours include a 52-cu. in. four-passenger Swift, a 76-cu. in. Singer and a 94-cu. in.



Alvis, the latter a high-grade five-passenger model selling at £450.

One of the outstanding features of the show is the increase in the number of four-speed gears, even the midget Singer now having four speeds. British makers are offering 21 different models with four-speed transmissions of the type having two silent speeds, all of these using helical constant-mesh and third-speed gears. Last year there were six models with two silent speeds. No transmissions with internal gears and no three-speed transmissions with two silent speeds are being shown. Both of the Daimler twelves use the fluid flywheel and the self-changing four-speed planetary transmission, which latter was developed by Armstrong-Siddeley and is now standard on all models of this make. The Daimler fluid flywheel is optional at extra cost on two Armstrong-Siddeley models. Packard is reported to have bought a Daimler with this transmission for test purposes.

No other fundamental innovations are in evidence. There are no new front-drive cars, nor any new cars with independent springing, and the Burney rear-engined, stream-lined car is not shown. Lanchester has adopted chromium-cast-iron cylinder liners and four-stage oil filtration by means of two magnetic and two fabric filters for chassis which are otherwise unchanged. The new Daimler sleeve-valve models, the same as last year's "Twenty-five," have aluminum cylinders without liners. The Stromberg downdraft carburetor has been adopted by Humber, while the new Bentley has hypoid bevel gear drive for the rear axle and a triple-eccentric drive for the overhead camshaft. Crossley is showing the six-wheeled sedan described in *Automotive Industries* for Oct. 4. Sunbeam has adopted Lockheed hydraulic brakes and uses the same shoes in the rear drums for both hand and foot operation. There is a slight increase in the use of centralized chassis lubrication. Bentley and Sunbeam carry oil directly to the spring plates, and more makers are using oil-less spring bushings and grouped nipples for bearings of the braking system. Cam steering is becoming almost universal, and the use of detachable wire wheels has greatly increased. An oil radiator is found only on the Daimler models. Rover & Armstrong have intake silencers.

Battery Ignition Displacing Magneto

Battery ignition has further displaced the magneto, but full automatic timing is still unusual. Singer connects the interrupter with the throttle in such a manner that the spark is fully advanced by the time the throttle is one-third open. The trend of recent years toward increased compression has ceased, and a retrograde movement is even indicated by the new models, only outspoken speed models having a compression ratio of 6 to 1 or thereabouts. Roller chains are largely superseding toothed chains and gears for camshaft and accessories drives, and the tendency is to eliminate adjustments in these drives.

Seven of the new models have L-head engines, five valve-in-head engines with valve operation by side rods, four overhead camshaft engines and three Knight

sleeve-valve engines. With the exception of two Wolseleys with overhead camshaft engines, all of the new models with price appeal have L-head engines.

Olympia differs notably from the Paris Show in the large number of fabric bodies on view. No British manufacturer has discontinued this type of body, but it is quite possible that metal sedans in the future will attract more buyers, as their prices are being reduced and are approaching closely to the level of fabric body prices. Some makers are offering both types at the same price. Morris and Wolseley employ all-steel bodies, while all the rest of the so-called metal bodies are of composite construction. Semi-paneled Weymann bodies are prominent among the custom types. Almost every British maker now is offering a sliding-roof sedan. Star has a horizontally hinged panel in the driver's window for signaling, and Hillman and Humber have hinged rear-quarter lights for ventilation. Star has adopted the hydraulic four-wheel jacking system as standard equipment. A majority of all makers now use safety glass.

New Sixes Command Attention

Among the new models that are attracting most attention are the Morris 125-cu. in. six of 105-in. wheelbase and 48-in. tread, which with sedan bodies sells at £225; the Vauxhall 124-cu. in. six with 107-in. wheelbase and 56-in. tread, selling at £280; the Wolseley 123-cu. in. six of 117-in. wheelbase and 56-in. tread, selling at £285, and the Standard 125-cu. in. six of 109-in. wheelbase and 48-in. tread, selling at £245. The chief British demand is still for midget fours with four-passenger sedan bodies, this being followed by the demand for sixes of about 220-cu. in. displacement and selling at under £300; then come fours of up to 80-cu. in. displacement and selling at about £200. The new Morris and Standard sixes constitute a new type intermediate between continued light fours and five-passenger light sixes. These new sixes have roomy four-passenger bodies, the bodies being similar to those of the continued fours and the engines the same as those of the continued light sixes, hence the performance is superior to that of both continued types.

Price reductions are almost universal, and in some cases quite drastic; thus Rover prices are down 20-25 per cent. The new Empire Hall of Olympia is being used for the first time, whereby the available floor space is increased by nearly 20 per cent, the additional space being devoted to exhibits of motor boats and garage equipment, both of which are featured at Olympia for the first time.

Passenger car makes exhibited include 31 British, 19 American, 17 French, six Italian, two Austrian, one Spanish and one German. The American makes include Auburn, Buick, Cadillac, Chevrolet, Chrysler, Cord, De Soto, Dodge, Essex, Franklin, Hudson, LaSalle, Marmon, Nash, Overland, Packard, Studebaker, Stutz and Willys. There are 503 exhibitors in all sections, including 56 exhibitors of coachwork, 340 of accessories and parts, 55 of boats, and 75 of garage equipment. Cars exhibited include eight two-cylinder, 104 fours, 300 sixes, 88 eights (of which only eight are British), seven twelves and two sixteens.

HOW'S BUSINESS?

GOING TO BE NEXT MONTH •

Charted by United Business Publishers, Inc.

THIRTY-FOUR ECONOMIC EXPERTS—EDITORS OF BUSINESS PAPERS PUBLISHED BY THE *United Business Publishers, Inc.*—HERE PRESENT A COMBINED OPINION ABOUT THE COURSE OF BUSINESS DURING THE MONTH OF NOVEMBER. GOVERNMENT AND OTHER RECORDS PROVIDE YOU WITH HISTORY OF RECENT MONTHS. THIS BOARD OF EXPERTS DEALS ONLY WITH THE FUTURE. ITS OPINIONS ARE BASED ON CLOSE CONTACT WITH THE MORE THAN 400,000 SUBSCRIBERS REACHED BY THEIR PUBLICATIONS IN FAR-FLUNG FIELDS OF RETAILING AND INDUSTRY.

STEEL, and its immediate parent, pig iron, have long been looked to as dependable indices of fundamental business conditions. In seven recessions and recoveries, plotted since 1893, there is a striking similarity in the tendencies of the curves, and encouragement in the fact that the present recession is the least severe of any shown.

In the six completed cycles, the average length of recovery has been 15 months. Reckoning from the bottom of last December, we now stand eleven months along the way, focusing upon next March.

Contributing factors, however, alter

cases. Commodity speculation and money stringency which have complicated in several instances in the past are at present lacking. On the other hand, world depression and unrest lean heavily upon present confidence.

And confidence is most essential at the moment. Confidence that would prompt the decision to increase the existing narrow margin of stocks, not only in steel, but in most other manufactured commodities as well, would undoubtedly go a long way toward putting the glow back into the pale cheeks of the industrial situation.

THE COURSE OF BUSINESS FORECAST FOR NEXT MONTH

BUSINESS	SALES	RETAIL STOCKS	COLLECTIONS	COMMENTS
AUTOMOTIVE	Passenger cars 20 to 25% less, and trucks 25 to 30% less in November than in October. Both lines 30 to 35% less than Nov., '29.	Stocks will continue about the same in November as in October, but considerably under Nov., '29.	Collections about the same in November as in October and better than Nov., '29.	Dealer stocks at a minimum, and better collections are the two bright spots in the automotive sales picture.
DEPARTMENT STORES	Increase of 5% over October, but about 7% behind Nov., '29.	About the same in November as in October, but 10% behind Nov., '29.	Same as October, and much slower than Nov., '29, but marked change from a month or two ago.	Expenses have not been cut in proportion to money intake. Profit prospects not especially bright.
HARDWARE	Should show normal seasonal increase particularly in Christmas merchandise and close to sales in Nov., '29.	Should be considerably heavier due to addition of holiday stocks—but slightly less than Nov., '29.	Should show steady improvement in Nov., but somewhat lighter than Nov., '29.	Wholesalers rather freely predict final quarter of 1930 will equal same three months in 1929.
INSURANCE	Life less in Nov. than in Oct., but ahead of Nov., '29. Fire and casualty probably less than Oct., and slightly behind Nov., '29.		Normal in all lines due to special effort to keep agency balances favorable.	Fire and casualty fields characterized by cautious underwriting. Every effort being made to keep collections well in hand.
JEWELRY	Anticipated improvement in Nov. as compared with Oct.—but less than Nov., '29.	Will increase in Nov., but lighter than in Nov., '29.	Sectional reports fluctuate from "much better" to "much lighter" than Nov., '29. Improvement over Oct. anticipated.	Christmas trade, which comprises about one-third the year's business should force sales up in Nov.
MACHINERY METAL PRODUCTS METALS	Anticipated Fall improvement in steel business has not materialized. Production declines and price recessions cloud the outlook for the remainder of the year.			Except for annual rail buying movement there are no prospects for large volume of steel business this Fall.
PETROLEUM (Gasoline)	Estimated decrease of 0.6% in Nov. as compared with Oct., with increase of 5% over Nov., '29.	Estimated increase of 6% in Nov. as compared with Oct., with increase of 20.5% over Nov., '29.		Gasoline consumption is still averaging over 1,110,000 bbls. a day.
PLUMBING AND HEATING	Expected to show increase over Oct. despite downward seasonal trend. Equal or better than Nov., '29.	About same in Nov. as in Oct., but lower than Nov., '29.	On a par with, or slightly better than Nov., '29.	Loan money now available for small borrower is aiding plumbing and heating industry.
SHOES	Retailers now enjoying six best selling weeks of the fall season, with present expectations of equalling sales in Nov., '29.	Slight increase of stocks in Nov. over Oct., but 10% lighter than Nov., '29.	Collections are steadier. More shoes sold on a cash basis.	Raw leather stocks increasing, giving tanners better selection which will result in better shoes at lower prices.



By J. Geschelin

JUDGING by the attendance of more than 300 men at the three technical sessions which featured the S.A.E. Annual Production Meeting, the importance of members whom we recognized there, and the wealth of discussion which the papers provoked, this year's Production Activity of the S.A.E. has gone far to interest those in the manufacturing end of the industry.

This year the production activity under the guidance of John Younger, vice-president of the S.A.E. and Professor of Industrial Engineering at the Ohio State University, was selected from men right on the firing line in automotive plants. They had the production man's slant, they were familiar with many of his most troublesome problems and consequently they were successful in selecting the topics that were uppermost in his mind. Probably the best evidence to support this was the enthusiasm of those who attended these technical sessions. Looking a little ahead of the parade, it was thought desirable to stress some of the applications of economics to the production process. Out of this idea came an economic session, consisting of two papers, and the general idea was carried into the philosophy back of some of the other papers. Moreover, it is the opinion of many of the higher executives that future developments in manufacturing will depend a good deal upon a better understanding and application of fundamental economic principles.

The economic session consisted of two papers, "The Tool Engineer's Place in Mass Production," by O. B. Jones, president of the Detroit School of Applied Science, and "The Effect of Time on Production Cost," by Paul N. Lehoczyk of the Department of Industrial

Economic Principles

Engineering, the Ohio State University. Mr. Jones, who has helped train thousands of tool engineers for the automotive industry, stated what in his opinion were the ideal requirements for the ideal tool engineer. Quoting from his paper: "Three factors that enter into the work of the man who plans how a part is to be launched into production are men, methods and machines. The ideal combination of these three factors is realized when the least number of men and the greatest number of machines are employed in the performance of a given task. The ideal factory should be pictured as a huge machine, and there should be no men in the machine. This ideal may never be possible of attainment, but it must be the ultimate aim."

Again, "Training of the tool engineer should deal primarily with the methods and equipment used for removing metal or machining the details and testing them for accuracy as to dimensions. Great emphasis should be placed on the designing of special devices which must be fitted to standard production machinery to adapt it to the performance of specific operations on certain details. His training should cover the exact methods and equipment used by leading automotive manufacturers. The subject matter of the course of training, that is, the textbooks and whatever other material is used, must be constantly watched to make certain that the information passed on to the student is abreast of developments in the most modern and efficient automobile manufacturing plants. The usual course in mechanical engineering fails to fit a man for the position of tool engineer. It is not sufficiently specific or modern, because it does not parallel the exact manufacturing conditions of the industry."

Among the essential courses of study, the speaker suggests that "Since the tool engineer must pass through the stage of tool designing, he should also be trained in drafting, for the tool designer spends his entire time making drawings of his own ideas or those of someone else. The course in drafting should permit the student to do very little copying, thus developing his initiative. Drawings should be made of jigs, fixtures, special perishable tools, machine attachments, and the gages required for the production of carefully selected parts of the car. The various parts chosen for study should be selected

Injected Into Annual Production Meeting

to bring out the principles to be followed by the designer in every phase of his work."

Among those participating in the discussion was L. A. Blackburn of the Oakland Motor Car Co. who had prepared a written discussion of the paper.

Professor Lehoczky, who has devoted considerable time to a study of economics in production lots, certainly enlisted the active attention of production men by his presentation of the problem. The gist of his discussion was that economic lot sizes

depend upon inverse relationship of various factors which he explained by saying that what is a favorable condition or arrangement for one of the factors is decidedly unfavorable for the other.

Accordingly the problem of determining economic lot sizes for intermittent production becomes one of balancing all of the factors which enter into the problem and finally finding the arrangement of factors which will just about equalize those that are favorable and those that are unfavorable.

After demonstrating an elementary application of a formula by means of which minimum cost lots can be determined, the author states a simple form of the general formula which includes the major factors given herewith. Table 1 gives a simple general form which may be suitably altered to include special factors peculiar to any industry.

Another and very interesting use for the formula is that of measuring the function efficiency of the existing set-up. For example, with this formula, any job may be studied to determine the relation between the cost of doing it in the present manner with the possible minimum cost. As a matter of fact, the minimum cost method may not be advisable because of special consideration. Nevertheless, the ratio between the possible minimum cost and the present cost is a measure of ultimate efficiency which might be set up as a reasonable goal.

A. R. Fors, K. W. Stillman, J. Geschelin and a

Definite wear tolerances should be set up for all inspection gages

Selection of conveyor system is simplified by A. S. M. E. formula and new data

Lot sizes depend upon the balancing of all factors involved + + +

number of others joined in the discussion on the floor.

The measurement of primary inspection gages, gage design and wear allowances were thoroughly aired in a carefully prepared paper, "Wear Allowances and Tolerances on Gages," by E. J. Bryant, of the Greenfield Tap & Die Corp. One of the valuable suggestions made is that definite wear tolerances should be set up for all gages, including master gages, inspection gages and production gages. In addition a definite time should be set for

the inspection of each gage and a record kept of the findings. Another important factor is the finish of the gaging surface which, according to latest research, should be machine-lapped for best results.

Mr. Bryant then says: "Go' gages, such as 'Go' plug gages, may be made larger than the minimum size hole usually by the amount that represents the production tolerance for the gage, although in some instances a definite wear allowance is made in addition the necessary production tolerance as shown in Table 1, which gives the regular gage-making tolerances used for Plain Plug gages, and in Table 2, which gives the production tolerances and allowances for Thread Gages.

"The wear on 'Not Go' gages is considerably less severe than on 'Go' gages. Generally three 'Go' gages will be used to one 'Not Go' gage. There are three practices regarding the applications of tolerances to the 'Not Go' gage. No allowances for wear other than the gage maker's tolerance is provided on any 'Not Go' gages.

"Some manufacturers split the gage-maker's tolerance on the 'Not Go' gage; for instance, where the gage-maker's tolerance is 0.0002 in. the 'Not Go' gage would be basic size plus or minus 0.0001 in. The National Screw Thread Commission's Report applies gage-maker's tolerance minus on 'Not Go' plug gages.

"The General Motors Standard specification on 'Not Go' screw-thread gages is maximum hole size

TABLE I

Formula for Economic Production Lots

From Prof. Paul N. Lehoczy's paper "The Effect of Time on Production Cost"

$$X = \sqrt{\frac{N C I (J + L - L J) + S_i}{2 S}}$$

X = number of lots to be used during the year.

C = cost per piece of material (raw).

I = interest rate per year.

S = set-up cost for one set-up.

S_i = cost of storing the finished product in dollars per piece per year.

J = ratio of output to capacity, the output being N pieces per year.

L = ratio of cost of finished product to cost of raw material, the factor taking into account the value added by the work done to the piece.

plus gage-maker's tolerance applied as follows: The 'Not Go' tolerance is maximum hole size plus gage maker's tolerance as follows: plus 0.0002 in. on pitch diameter sizes 1/4 to 9/16 in., inclusive, and maximum hole size to 0.0003 in. on the pitch diameter on sizes 5/8 to 1 1/2 in. The corresponding 'go' tolerance is from basic size to plus 0.0002 in. on sizes 1/4 to 9/16 in. and basic to plus 0.0003 in. on sizes 5/8 to 1 1/2 in.

"It will be seen by following the first and last practices that we are likely to have gages that measure outside of the production tolerance."

In checking gages for wear, measurements are an important factor, according to the speaker. Errors in reading micrometer and measuring machines are usually less than the errors in the instruments themselves. Pressure in making measurements is also important, particularly when using balls, rolls or wire. In case of wire measurements of thread, the approved practice is that threads finer than 20 per in. are checked with a measuring pressure of 8 oz. and threads 20 per in. and coarser are checked with 3 lb. pressure. Taper plugs are usually checked with wire or rolls. On large work, temperature is a factor in checking, although the changes due to temperature are slight, approximately 0.0001 in. in a length of 16 in. for each degree.

Thread gages are found to wear more rapidly and to cut the thread. Ring gages that show practically no wear when checked with a setting plug with basic outside diameter will frequently show considerable wear when tested with a check truncated to 60 per cent of the full depth. It is recommended that worn gages should be rejected when they have reached the wear limit. In the case of 'go' gages, they should be basic size, although in some instances it is economical to permit undersize fit.

Written discussions for this paper were sent in by D. W. Ovaite of General Motors and W. H. Gourlie of Pratt & Whitney. Mr. Ovaite disclosed the fact that General Motors practice is different from the A.S.A. allowances and tolerances for metal fits which were given in Table 3 of Mr. Bryant's paper. The suggestion was made that the General Motors standards be pub-

lished so as to show both systems side by side.

By presenting a large number of slides showing unusual conveyors and other types of materials handling systems in other industries not related to the automotive field, J. H. Hough of the Mathews Conveyor Co. provided considerable additional interest to his paper, "Conveyors in the Automotive Industry." By far the most valuable phase of the paper was that portion dealing with a study of data and methods for figuring savings and investments, which again carries out the principle of applying the economic method to manufacturing problems.

The A.S.M.E. formula, developed by the Materials Handling Division, as well as the definition of each factor, are as given in Table II. Later in the paper Mr. Hough shows how these formulas are used in several examples

typical of usual conditions.

The most unusual feature of Mr. Hough's presentation is Table III giving comparative costs of different kinds of conveyors for estimating purposes in the formula. Thus he provides a means not only of estimating the cost of operation of various systems but also makes it possible to determine whether or not the mechanization of certain operations is justified at all.

Spirited discussion, led by Gordon Lefebvre, followed. Participating in this were J. B. Webb, J. E. McBride of Palmer-Bee and a representative of Mechanical Handling Systems.

An outstanding authority on the machinability and physical properties of aluminum and its alloys, R. L. Templin of the Aluminum Co. of America, discussed

TABLE II

Formula for Estimating Comparative Costs of Materials Handling Systems

From J. H. Hough's paper "Conveyors in the Automotive Industry"

$$Z = \frac{(S + T + U - E) X}{(A + B + C + D)} \quad (1)$$

$$Y = I (A + B + C + D) \quad (2)$$

$$V = (S + T + U - E) X - Y \quad (3)$$

Debit Items	A = percentage allowance on investment.
	B = percentage allowance to provide for insurance, taxes, etc.
	C = percentage allowance to provide for upkeep.
	D = percentage allowance to provide for depreciation and obsolescence.
	E = Yearly cost of power, supplies, and other items which are consumed, total in dollars.
Credit Items	S = Yearly saving in direct cost of labor, in dollars.
	T = Yearly saving in fixed charges, operating charges or burden, in dollars.
	U = Yearly saving or earning through increased production, in dollars.
Results	X = percentage of year during which equipment will be employed.
	I = Initial cost of mechanical equipment.
	Z = Maximum investment in dollars justified by the above consideration.
	Y = Yearly cost of maintaining mechanical equipment ready for operation. Yearly profit from operation of mechanical equipment.

"New Developments in Machining Aluminum and Its Alloys."

"The material from which the tool is made," said Mr. Templin, "will not only affect the life of the tool but also the cutting rate used. The choice of tool material will be governed to some extent by the type of tool, the machine with which the work is to be done and the character of the work. High-carbon steel tools ground to the thin cutting edges desired for aluminum may give an early failure because of brittleness. High-speed steel tools give much better results when machining alloys of aluminum except those containing appreciable amounts of silicon. These high-silicon alloys, however, can be readily machined on a production basis using the cemented-tungsten-carbide tools. Apparently there are differences in the bonding material or degree of bonding in the various kinds of the cemented-tungsten-carbide tools, sometimes in different lots of the same make. Those kinds and lots which have the greatest toughness seem to give best results in machining aluminum."

"The rate of cutting is a function of speed, feed and depth of cut. Each of these may be and usually are closely related not only to each other but also to any or all of the other factors under consideration. If, for example, the tool is of the desired shape, very high speeds frequently can be used in machining aluminum but because of the comparatively thin cutting edges of the tools rather fine feeds with moderate depth of cut, or moderate feeds with small depth of cut, will generally give best results. When the type of tool is such that the desired shape of the cutting edges cannot be used, e.g., the optimum top rake, there may occur a marked curling of the cuttings or chips with consequent increase in the frictional heat developed. Under such conditions a lower cutting speed, smaller feed or depth of cut, or more coolant must be used."

Among other things Mr. Templin stressed the importance of instructing the machine operator, as well as the tool engineer, in the proper feeds and speeds and special tool forms absolutely essential to successful machining of aluminum and its alloy. He was particularly pleased with the educational effort in the development of cemented-tungsten-carbide tools, as the requirements for these new tools were so close to his problems. Their work with coolant indicates that satisfactory results may be obtained with a mixture of equal parts of lard oil and kerosene. The proportions can often be varied with advantage, for example, by using more lard oil for heavy cuts and more kerosene for light cuts at high speed. For economy it may be entirely satisfactory to use solutions of soluble oil and water.

Adding to a background of broad, practical experience with various types of cemented-tungsten-carbide tools in the General Motors Research Laboratories, W. H. McCoy of the General Motors Corp. visited a number of the research laboratories of the

TABLE III

Comparative Costs of Different Types of Conveyor for Estimating Purposes

Roller Conveyors	
Capacity 300 lb. per lineal ft.....	\$ 3.00
Capacity 1,000 lb. per lineal ft.....	4.00
Capacity 4,000 lb. per lineal ft.....	7.00
Capacity 10,000 lb. per lineal ft.....	25.00
No. 458 Overhead Chain Trolley Conveyors	
Capacity 50 lb. per ft., trolleys spaced 24 in.....	6.30
Capacity 100 lb. per ft., trolleys spaced 24 in.....	6.80
Capacity 200 lb. per ft., trolleys spaced 24 in.....	7.30
Belt Conveyors, Stitched Canvas	
24 in. wide, 4 ply, roller tread; Capacity 100 lb. per ft.....	10.40
24 in. wide, 4 ply, roller tread; Capacity 200 lb. per ft.....	12.00
Apron Conveyors, Steel Roller Chains	
24 in. channel pallets, Capacity 100 lb. per ft.....	25.40
24 in. channel pallets, Capacity 300 lb. per ft.....	36.80
Inclined Pusher-Bar Elevators	
Capacity, 100 lb. packages.....	28.00
Capacity, 300 lb. packages.....	41.00
Vertical Tray Elevators	
Capacity, 100 lb. packages.....	78.00
Capacity, 300 lb. packages.....	82.50
Electric Hoist Elevators	
Capacity, 100 lb. packages.....	42.00
Capacity, 600 lb. packages.....	46.30
Monorail Conveyors, Without Trolleys	
Arranged for hand power; rail per ft.....	1.50
Switches (hand power), each.....	20.00
Arranged for electric hoists, rail per ft.....	2.50
Switches (electric hoists), each.....	125.00
Drag Chain Conveyors	
Capacity, 100 lb. per ft.....	19.00
Capacity, 400 lb. per ft.....	26.60
1—Turn sheet, metal spiral, 6 ft. 0 in. dia., 2 ft. 6 in wide tread, vertical lift per tread 7 ft. 7 in.....	283.00
1—Tapered roller spiral, 8 ft. 0 in., 4 in. wide tread, vertical lift per tread 2 ft. 4 in.....	228.00
1—Gas Tractor, small, 3 wheel, industrial.....	1,250.00
1—Gas Tractor, large, 4 wheel, industrial.....	1,600.00
1—Electric elevating truck, 3 ton, with battery (battery charger extra)	2,430.00
1—Electric elevating truck, 5 ton, with battery (battery charger extra)	3,275.00
1—Hand-lift truck	250.00

manufacturers of this new tool material in search of the ideas which appear in his paper, "The Future Development of Tungsten Carbide as a Cutting Tool." An interesting theory which explains the probable reason for the abrasion of cemented-tungsten-carbide tips is explained by Mr. McCoy in the following manner:

"As cemented-tungsten-carbide has a high head conductivity and one which is higher than that of the shank material, when cemented tungsten-tungsten-carbide tools are cutting a material which generates a great amount of heat, two things are apt to happen; first, the shank gets very hot and expands away from the tip, breaking the bond; and, second, there is a tendency to alloy between the chip and the excessively hot cemented-tungsten-carbide. This latter effect is particularly noticeable when cutting soft steel and is not so noticeable when cutting

(Turn to page 623, please)

JUST AMONG OURSELVES

Thought Coordinated of Departments is Needed

IF ever there was a need for some sort of automotive Esperanto, that time is now. Too often, even at this late date, production men and engineers don't speak the same language.

Strenuous efforts at coordination of thinking and action have been made by nearly every automotive management in the last five years. Yet the weld is smooth and permanent in only a few scattered instances.

And the weld can be smooth and permanent only through individual ability on the part of scores of individual production men and individual engineers, not merely to see, but to understand, the other department's point of view. Management rulings never can fully lick the problem.

There is far less of jealousy between the departments today than there used to be, but the ability to approach common problems from a common viewpoint hasn't reached any very high peak so far as the average condition is concerned.

Knowing the Other Job Eliminates Prejudices

WHO'S to blame? We value our life too highly to chance any direct answer to this question: but a few points

worth discussion do occur to us.

Increased knowledge of the other fellow's problems has always been the best known antidote to prejudices. Every one of us will speak more glibly about how the president ought to run the United States than we will about how some detailed technical problem intimately connected with our own work should be solved.

The production man and the engineer then—to help increase the effectiveness and economy of their operations—need a more active general interest in the basic as well as in the specific problems of the other department. An original meeting of minds often is much easier on some point about which neither engineer nor production man is immediately concerned that day, than on some current problem on which time, official pressure and whatnot are making minds tense instead of relaxed.

At the risk of receiving brickbats at high velocity from our many good friends in the production department, we do venture the opinion that the average design engineer, by training, by education and by nature has a broader conception of the relation of his work to management problems and a mind more generally attuned to approaching problems in the abstract than has the average production man. . . . Plenty of exceptions both ways, of course.

It does seem as though the average design engineer gains

more through contact with the personalities and ideas of other design engineers, for example, than does the average production man. He reads more widely—concerning his own work in business publications and concerning things outside his work in books and general periodicals; he gets more out of the Society of Automotive Engineers than does the production man—largely because he gives more; he has a greater ability to apply to his own specific problems general ideas picked up in meetings or in reading.

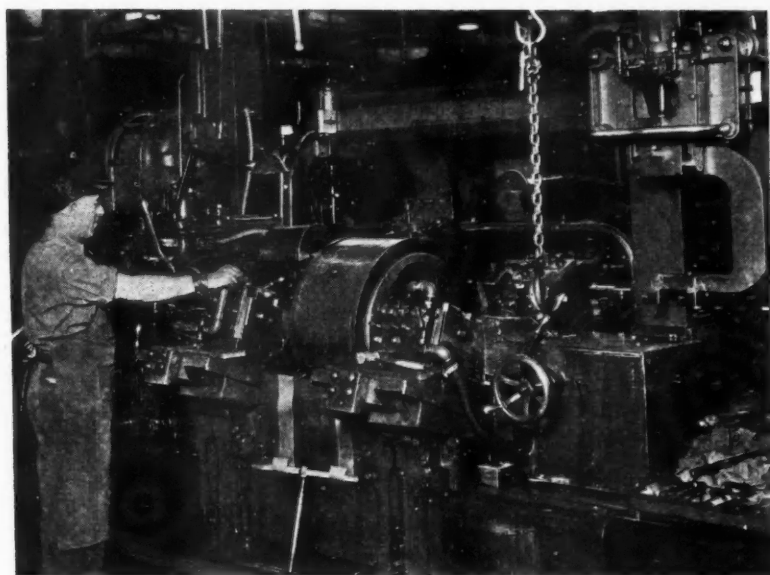
Production Men Should Court Outside Contacts

NOW there are plenty of reasons for this state of affairs. The average design engineer is presented with greater opportunities along this line than is the average production man. Probably in many cases a production man has made better use of the opportunities which have been given him than has a design engineer.

That's all the more reason for the production man to make strong efforts to obtain for himself and his department the same chances for outside contact with outside men and ideas as are commonly given the design end of the engineering department.

And all the more reason for general managers and company executives to encourage rather than hinder this type of mental and technical development on the part of their production men. It will mean thousands of dollars in the cash drawer in the long run.—N.G.S.

Crankshaft Machining Requires Diversity of Operations



By Athel F. Denham

A LeBlond center-drive lathe is used at the Reo plant for roughing the 1, 2, 8 and 9 bearings.

Note the air loading device which facilitates handling + + + + +

Any one of many factory conditions can produce out of balance crankshafts

It would be a difficult matter to select any one part of the automotive vehicle, or internal combustion engine, regarding the machining of which there is more difference not only of method but also of opinion, than is the case with the crankshaft.

A time was, not so very long ago at that, when all that was necessary to make a crankshaft was to secure a forging somewhat near the finished shape, grind the main bearings and the pin bearings, drill and ream a few holes, and let it go at that. It was only in later years, when crankshaft balance became an important element, when pressure lubrication came into existence, involving the need for closer tolerances, as one result of the increase in bearing loads, etc., that the crankshaft became a highly complicated piece of equipment, and the subject of considerable modifications both in design and in methods of production.

Outstanding of the major qualifications with which a crankshaft has to comply in the finished state are the following:

First—The shaft must be in balance, both as to free forces, and as to couples. Weaving, twisting (due to

couples) and vibration (due to free forces) must be reduced to the minimum.

Second—Main bearings must be accurately aligned, to insure interchangeability and ready assembly in the engine.

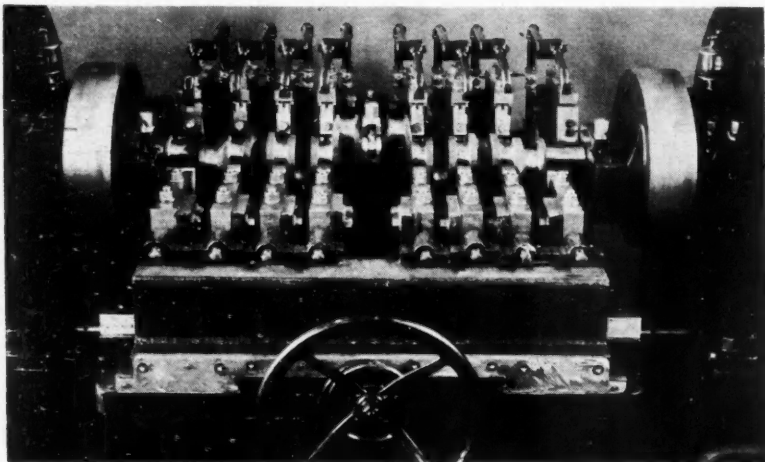
Third—The angular disposal of the crank throws about the shaft must be held to close limits, to secure smoothness of engine operation, etc.

Fourth—Parallelism between main bearing and crankpin axes must be accurately maintained for reduction of side wall pressures, etc.

Fifth—Bearings must be held to close tolerances for diameter, out of round and taper, to facilitate the interchangeable use of bearings with low uniform clearance, especially in view of the lubrication requirements in modern engines. For much the same reason, spacing between bearings must be accurately maintained, since side clearances must be held to close limits.

To anyone who has in any manner been associated with the design or production of crankshafts, reiteration of the above factors may seem rather elementary. However, it is these very requirements, the efforts to meet them, the inability to meet them without costly processes, which underlie the fundamentals of the production process.

As everyone associated with the production of crankshafts knows, modern complicated production methods on crankshafts evolved as a necessary corollary to a number of factors, not the least two of which were the need for heavier, deeper and closer



This view shows a double-end-drive Wicks used for turning and cheeking all but the previously ground center main in one setup + + + + +

crank-cheeks, and the cost of diamond dressing of grinding wheels. It is hardly necessary to discuss these various factors here. Suffice it to say at this time that crankshafts are being produced at present at costs ranging anywhere from \$1.50 to \$9.00 and more, for the finished unit, delivered to the assembly line. If it is possible to solve some of the more fundamental of the problems it is not unreasonable to suppose that this cost can be reduced to a range of between \$0.50 and \$3.00 for various types and sizes. In fact we know of one company that has assured itself that it can produce a certain finished-all-over shaft, designed for pressure lubrication, at a cost of \$0.55. Such lowered costs, however cannot be obtained generally, except by the closest cooperation and understanding of each others' problems by the various organizations involved, the engineers in charge of the design, the forge shop, the machine shop and the machine tool manufacturers.

To return to the crankshaft and our list of major requirements. The question of balance is one that quite frequently, from the observations of the writer, is not clearly understood even occasionally by production men. The two terms, static and dynamic balance, are commonly accepted to mean balance when the shaft is running and balance when the shaft is standing still. If these were the real meanings there would be no point in static balancing a shaft.

Dynamic and Static Balance

Moreover it is a generally accepted theory that a crankshaft to be in true "dynamic" balance must also be in "static" balance. This is not necessarily true. A better nomenclature would be one based on the idea that crankshafts must be balanced both for free forces acting about the longitudinal axis through the center of mass, and also for couples in the plane at right angles to that of the free forces. Fortunately most modern "dynamic" balancing equipment is designed to indicate out-of-balance conditions under both possibilities, so that correcting for "static" balance, obtained generally by the balancing of a crankshaft on knife edges, or preferably rounded ways, may be either eliminated, or used as a method of reducing

the total unbalance before placing the shaft in "dynamic" balance, or to throw the unbalanced condition in the shaft into a location where it can be more easily corrected for to the amount indicated by the dynamic balancing equipment.

The problems of balance, alignment, index correctness, and parallelism, are so closely interrelated as far as the production processes are involved, that a discussion of one without the other is almost meaningless. Misalignment and out of parallel or index of the main bearings, for instance, may be caused by any of a number of conditions. Misalignment of jigs, fixtures; improper chucking, inadequate straightening, and distortion of the crankshaft itself, are some of the leading causes. Any one of them can produce an out-of-balance condition of the shaft. Nevertheless, the policy followed rather generally by the industry of requiring that forgings be supplied the machine shop within certain limits of balance is a desirable one, provided that such balance is due to equal and accurate mass distribution and that the limits specified are not closer than the probable errors introduced in the machining operations.

Again, there is a difference of opinion as to how much excess material should exist in the forging. One school has it that the minimum of material permits lighter cuts, or fewer of them, and thus minimizes distortion of a crankshaft. The other school believes that sufficient material should be left on the shaft so that all strains and distortions, whether inherent or produced during machining, can gradually be machined out of the shaft. Which school is right, it is pretty hard to say. Certainly, on the face of it, less material requiring removal should make for lower machining cost, and possibly for less distortion due to machining itself. Yet, the only company of those included in this survey, where no cold straightening of the shaft is employed, Cadillac, belongs to the second school.

Intimately involved in this question of distortion again is the question of basic design of the crankshaft. There are again two distinct schools in the engineering fraternity. One believes that a crankshaft should be made with sufficient inherent rigidity, so that it will "stay put" in the crankcase of its own accord. Into this school fall most of the designers who favor the use of a relatively small number of main bearings—five-bearing shafts on eights, three or four-bearing on sixes. The second school believes that it is desirable to make a crankshaft light and make the crankcase rigid enough to hold the shaft in alignment. This school naturally prefers the nine-bearing shafts for

eight-cylinder cars, and the seven-bearing for sixes.

Each of the two schools have a logical argument, and the only answer to the controversy is a compromise, agreeing with both sides. The efficiency of the particular design selected depends on too many other characteristics in the engine in which it is to be used.

Looking at the production elements involved in these opposed views, we have the further contentions that:

1. A light crankshaft that has been slightly distorted in production assumes a normal position due to the rigidity of the crankcase, and is also more easily straightened.

2. A heavy shaft is less susceptible to distortion during machining due to its inherent rigidity.

From the distortion-during-machining angle, we might add that the light shaft with its larger number of bearings offers a more ready support, close to the part being machined, so that the inherent strength of the other type of shaft may be offset to an unknown extent by this theoretical advantage of the multi-bearing shaft. The actual amount of advantage gained depends largely on the production process and equipment.

As to the maintaining of bearing tolerances for out-of-round, taper and diameter, these questions apply so much to one shaft as another, and are so generally standardized that little more can be done here except to indicate precautions that might be taken with equipment, etc., to facilitate meeting the established requirements.

Actual Methods

To come down to the actual methods used in producing a crankshaft, these can be separated into three major groups:

First—Forging the shaft, heat-treating, and preparing it for the machine shop.

Second—Roughing the shaft, using cutting tools and lathes.

Third—Finishing the shaft, by grinding, supplemented for utmost accuracy of finish by honing and polishing of bearings.

For the purpose of this discussion, the question of drilling oil leads, machining the flywheel flange, gear or sprocket seat, keyways, and the holes in the front and rear end, for the pilot bushing and starting crank connections, etc., will be eliminated, due to space limitations.

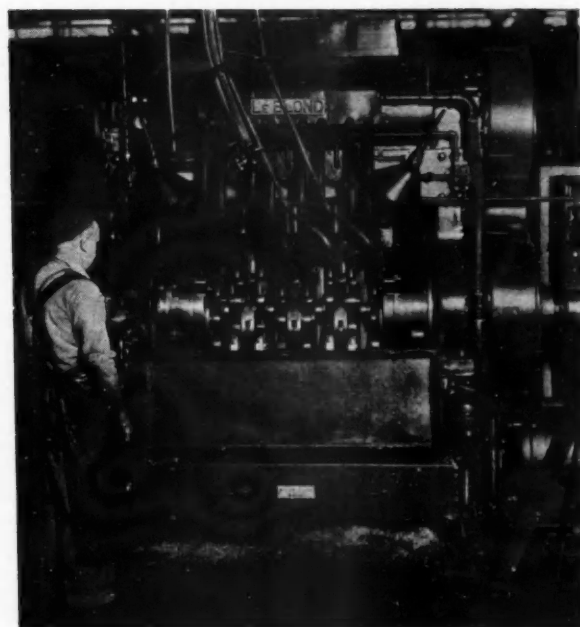
Probably the greatest problems in producing a finished crankshaft are those directly or indirectly related to distortion and mass distribution. Starting at the forge shop, a set of crankshaft dies on an average may produce around 4000 to 5000 crankshafts that will meet the most rigid requirements. More important than the actual forging is the heat-treating of the shaft. Improper heat-treat can spoil all the good work done by accurate forging. Unfortunately, little scientific knowledge is available on what actually happens to a shaft during heat-treat. Regulation of the rate of "growth," etc., awaits the availability of such data, and this in turn awaits the development of optical instruments capable of accurately supplying the needed information on a large run of shafts.

Beginning with the heat-treat, the operations assume growing importance in their relation to possible subsequent troubles. A long step in advance was made with the development of equipment for rigidly holding a crankshaft in alignment, and index, etc., during quench and subsequent annealing, this making possible the assumption that a balanced forging will also have a reasonably uniform excess material distribution.

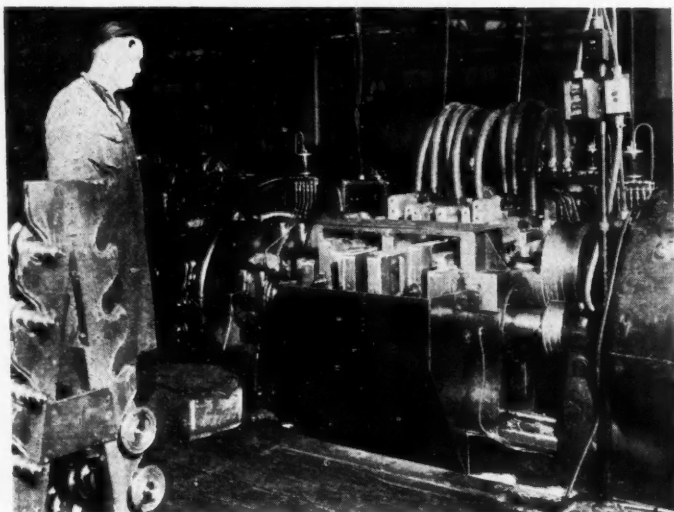
Most forge shops are now required to deliver forgings balanced to within a few ounce-inches, generally also centered. It would easily be possible to center a shaft in close to exact balance and still produce a forging which either would not clean up or would be away off balance after the machining operations, no matter how little distortion or how few machining inaccuracies were present. Practically all major crankshaft forging producers now have equipment for centering and index-marking their forgings. A number also space-mark their shafts.

An interesting sidelight in this respect is the Ford Motor Co.'s method of acceptance inspection of forgings. Ford, like a number of other companies, has its own centering equipment, on which shafts are centered to dead-center by means of gages. A dozen shafts from each lot are centered, run through the rough-machining operations and then sent to the balancing equipment. If they meet the rather stringent balance requirements at that point, the entire lot of forgings is accepted, if not, it is rejected.

This process, of course, assumes that the actual stock removal does not distort the shaft. While many production men in the industry can be found who insist that the removal of stock in roughing a shaft does not in itself produce distortion, this cannot be accepted as generally true. Certainly, if a forging



This LeBlond machine is used by Reo and is one of the most widely used types of multiple pin rough turning equipment



The Wickes machine shown here is also of a popular type of multiple pin equipment and roughs the pins on the Dictator Eight shaft at Studebaker + + + + +

were first quenched and then cold-straightened, removal of the skin would relieve some of the strains set up by quenching and straightening and tend to let the shaft spring back. Carbon vanadium steel shafts, as used by Studebaker and Pierce-Arrow, are claimed to be advantageous in this respect, in that they are not quenched, but are normalized and that, therefore, one source of possible strains, that due to quenching, is removed.

It should be remembered that there are any number of causes of crankshaft distortion, however, during machining. These might be listed as follows, without particular attention to order of importance, since the order will vary in different shops:

1. Torque produced by the cutting tools in roughing the shaft.
2. Side pressure occasioned by the cutting tools, especially the broad-nosed forming tools, when not properly balanced by opposed tool pressure or back rests.
3. Heat occasioned by the cutting of metal.
4. Strains set up in the crankcase due to the compression of the surface metal left after removing the excess (under the tool).
5. Misalignment of the shaft in the machine tool, including the springing of the shaft by locking it too tight between centers, etc.
6. Relieving of possibly inherent quenching and forging strains (already mentioned).

While there are a number of other minor possible causes of distortion in a crankshaft, any excessive need for straightening the shaft in production is generally traceable to one of the above causes. It is assumed here, of course, that such straightening operations as are employed in a given production line-up are really essential. It is the writer's opinion, however, that cold-straightening is often called for at different points in a production line where actually such straightening is not really necessary. The "straightening" of shafts in which bearings have actually been machined off center might seem an exaggerated case, although it occasionally occurs. Wherever a considerable number of straightening operations seem to be needed though, it would pay the production man to investi-

gate a little closer the conditions under which previous machining operations have been performed.

Not in every case, however, will the correction of the cause of the trouble lie entirely within the scope of the machine shop. Minor design or forging changes may occasionally, however, eliminate some straightening.

Let us suppose, for the sake of brevity, however, that a reasonably satisfactory crankshaft forging has been produced and delivered to the machine shop. The first step necessary, of course, is the centering of the shaft, if this has not already been done. Whether the shaft is centered by the producer of the forgings or in the machine shop does not really matter. The basic problem in centering, of course, is to establish the approximate axis of the *finished* shaft. For this purpose, it is essential that the center be so located that the shaft will not only clean up all over but also that there will be a fairly equal amount of stock removal on all sides. The ideal method of centering a forging probably would be in the dies, but as yet, to the writer's knowledge, no method enabling such a procedure has yet been worked out.

Centering a Crankshaft

Another method of centering a crankshaft to the true center of mass would be to spin the shaft on its dead center. Another method, occasionally used, is to locate the shaft in a fixture from the various crankcheeks. In the latter method, it must be remembered, however, that small forging errors on one or two cheeks might seriously affect the accuracy of location of the centers. While a number of interesting methods of centering crankshaft forgings have been worked out by individual companies, space limitations prohibit the discussion of their relative advantages and disadvantages here. Only one thing might be pointed out again, and that is the necessity for accuracy in this first vital operation. Not infrequently badly out-of-balance conditions in a machined shaft are due to improper centering in the first place, especially in a shaft which is not finished all over. Recentering of a shaft following the roughing operations can only correct for distortion, etc. It cannot correct for unbalanced mass distribution, especially in the cheeks.

Following the centering of the shaft, it is almost universal practice to rough out the main bearings, using the centers as a references point. For this purpose it is the accepted practice to first secure a third locating point midway of the shaft. This is most frequently done by spot-grinding the center main bear-

ing of a shaft with an odd number of bearings, or the two center mains where there are an even number of bearings. The necessity for securing an accurate central locating point is evident when it is remembered that it enables a reduction by at least 50 per cent of the unsupported length of the crankshaft during the machining operations on the other main bearings, important in reducing distortion, misalignment troubles, etc.

There is, however, considerable difference of opinion as to this initial machining procedure. In one group of companies the practice used is to merely spot-grind the center main bearing, leaving the actual rough forming of the center main bearing, including the cheeking, for a later period. This group includes such companies as Ford, Cadillac and Packard. In the second group, rough forming and cheeking of the center main bearings precedes the spot-grinding operation. This group includes such companies as Studebaker, Jackson Motorshaft, Hupmobile, Dodge and Saginaw Crankshaft Division (General Motors). The advantage of the first method is that a locating point is secured on the center main bearing with the minimum of distortion due to stock removal.

Another Method

The second method has the advantage of securing a locating point on a bearing which is somewhere nearer its finished condition. The method to be selected depends largely on the type of equipment to be used and the routing of the shaft through subsequent operations. A point to be remembered is whether the center main bearing is to be used only as a temporary locating point, or whether it is to be a major reference point throughout the subsequent roughing operations. For rough turning the center main bearing before grinding, both single and double-end drive lathes are used. Potchucks with self-adjusting (self-centering) drivers, either mechanical, or air-operated, are a decided advantage for this operation to reduce the unsupported length and minimize distortion.

To indicate the diversity of application of this first operation, roughing or spotting the center main, citing of a few practices might be of interest. Packard, with a nine-bearing eight throw crank, has two spot grinds, a rough spotting and a finish spotting. This should give this company unusual accuracy in alignment with the drilled centers with the minimum of distortion. Following the spotting, the front main is rough turned and cheeked with a potchuck extension on the center main bearing. The same is done for the rear main. Then all other main bearings, including the center, are both rough turned and cheeked on a double-end drive lathe at one time.

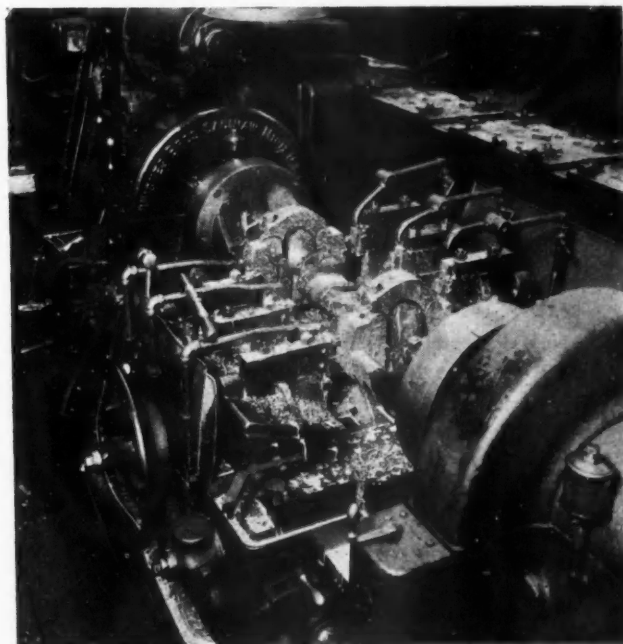
Location here is, of course, taken from the end mains, with intermediate steady rest. In this case, the spotting of the center main served mainly to insure accuracy of machining the end mains, and the latter are the ones actually used for locating during the major roughing operations on the main bearings.

Ford on its three-bearing four-throw shaft follows the same process, more or less, turning all three mains at once after the shaft ends have been turned with references to the spotted center main. Ford, however,

needs but one spot grind with the shorter shaft. The Cadillac shaft, whether for the V-8, the V-12 or the V-16, is also relatively short, compared to its weight and section modulus. This company uses the spot-ground center main for locating in a center drive lathe to machine the other main bearings. However, two operations are performed on the end mains, a roughing and a smoothing, the latter to assure accuracy of relation of the end mains to the central axis, preceding the pin turning.

Reo on its nine-bearing eight-throw crankshaft does not spot grind the center main at all for the first roughing operations on the main bearings. The center main is first rough turned and finish cheeked, then the four bearings adjacent to the center are rough turned and cheeked on a double-end drive, and then the four outer bearings are roughed and cheeked on a center drive. Having thus roughed out the main bearings, the shaft is recentered and straightened.

The practice followed on the five-bearing eight-throw Dodge crankshaft is virtually the opposite of the Reo method. The center main is first rough turned and cheeked. The shaft is then straightened to correct for any distortion occasioned in the first operation. Then the center main is rough ground to provide a locating point for the immediately following rough turning and cheeking of the other main bearings on a center drive. Still using the center main as a reference point, the end bearings are then semi-finish ground to serve for future location. Whereas in the case of Reo, the machining of the center main was only a temporary expedient and a stock removal operation in the preliminary roughing sequence, in the case of Dodge the first operation has a definite bearing on the manner of locating for all subsequent related operations.



Continental Motors secures flexibility and quick change over facilities in its crankshaft machining line by special attention to tool block mounting plates, which it will be noted are provided with Vee slots + + + +



Studebaker has an unusually interesting fixture for straightening its crankshafts. It is cam operated, requires no shifting of the crankshaft, and has a straightening clamp, operated from below, for each throw of the crank. The operator is shown straightening the shaft at the No. 3 main bearing +

The idea of correcting for distortion before the first grind on the center main is carried a step further by Hupmobile. In this company's eight-throw five-bearing shaft the three center mains are all rough turned, cheeked and filleted in the first operation on a double-end drive lathe with self-adjusting drivers. The shaft is then straightened before rough grinding the center main bearing for locating purposes.

Another viewpoint is that represented by the nine-bearing Studebaker President Eight shaft. On this shaft the center main is first rough turned and cheeked, and without intermediate straightening is spot ground for a steady rest for use in roughing the front and rear main bearings. Only following the latter two operations is the shaft straightened, so that the center main bearing in its rough-machined state serves as a definite starting point for locating the diameters of the other main bearings.

Just how much of the main-bearing machining should be done—how much stock should be left for final cleaning up—before any work is done on machining the pins and insides of the cheeks—evidently is a moot question, judging from the diversity of methods followed. That some amount of correction on the main bearings will have to be made following the pin machining is evident, as with the best alignment conditions in the machine tool, there inevitably will be some distortion of the shaft. Just how much will be necessary depends again on a great variety of factors: the amount of stock to be removed from the pins and cheeks, heat, tool pressure, design of the shaft, relieving of inherent strains, accuracy of alignment, etc.

Further, there is a difference of opinion as to whether correction for the distortion, misalignment, etc., should be made at the main bearings or at the pins. To begin with, it is more usual practice to rough grind the end mains before pin turning, accuracy of locating being an important element in favor of such a practice.

In the case of Packard, the first pin-turning operation finds the main bearings only rough turned. The reason for this becomes clear when it is noted that following the rough pin turning, Packard cam turns the contours, straightens the shaft, recenters it, finish cheeks the mains and finish turns the mains before returning to the pins for a finish operation. In other words, Packard brings the entire shaft to a rough-machined condition and then starts over again with a recentered shaft.

Dodge, on the other hand, semi-finish grinds the main bearings before roughing the pins. Following the latter operation, the shaft is straightened, recentered and the pins are finish turned. Any errors, misalignment, distortion, etc., arising from roughing the pins are, therefore, corrected at the pins rather in the main bearings.

The reverse was found true at the Saginaw Crankshaft Division, where only the end mains were rough ground, the others being in the rough-turned state. The pin-roughing operation here was followed, after an intermediate straightening operation, by rough grinding the pins before returning to the mains. An interesting departure was found in this case in the sequence of pin turning. The aforementioned straightening operation is performed just before the turning of the two center pins, all other pins having already been turned in pairs. The reason underlying this procedure is founded on the belief that distortion of the crankshaft takes the form of an arc, with the maximum off-center distortion at the center. By straightening the shaft before machining the center pins, off-center turning of the latter, due to preliminary distortion, is avoided.

Maximum Off-Center at the Center

In the case of Cadillac, which company, it will be remembered, does not straighten its shaft at any point, front and rear mains are found to be "finish turned" before roughing the pins. These end main bearings are the key-locating points as far as alignment and parallelism is concerned, and the next succeeding operation, after roughing the pins, is a recentering of the shaft to these end main bearings. The other mains are then rough ground and finish cheeked before returning to the pins for the finish-turning operation. Altogether, Cadillac has five steps of stock removal at the pins, two turning operations and three grinds.

Reo evidently works on the theory that if the two end and the center main bearings are machined in correct relation to the pins, the other main bearings will take care of themselves. Reo crankshafts thus have the 1, 5 and 9 mains rough ground before the first pin-turning operation (other mains being in the rough-turned state). These three bearings are re-ground following pin turning, the shaft is then straightened and set up for finish turning of the pins, locating from the end mains as before. Finish turning of the intermediate main bearings falls in the case of Reo between the finish turning and finish grinding of the pins, the latter operation preceded by a straightening to take care of distortion arising from turning the intermediates.

Ford crankshafts have the pins turned following "rough grinding" of the end mains. But following the roughing of the pins and machining of the cheek contours, the shaft is subjected to a heat-treat, straightening and recentering before semi-finish grinding the mains. So that the rough grinding of the end mains in the first place is more for locating accuracy rather than semi-finishing.

Studebaker shafts have all mains finish turned before pin turning, the end main in addition being rough ground. Subsequent to the rough pin turning, the sequence is similar to that employed by Packard, involving, in order, a straightening, recentering, finish cheeking, another straightening, semi-finish grinding the mains and then rough grinding the pins.

While the practice at Jackson Motor Shaft varies with different shafts, it is this company's more general practice to follow the pin-roughing operation only with a finishing of the mains and pins, other main-bearing turning and rough grinding having preceded this stage.

Terminology

The use of the terms "finish turning," "rough grinding," etc., here is mainly to indicate the number of operations to be performed on the particular surfaces referred to. A more accurate designation would probably be to indicate the number of thousandths still remaining to be removed. To give this, however, in a manner that would enable a proper analysis is beyond the space limitations of this discussion.

Too much stress, however, cannot be laid on the importance of splitting up the necessary stock removal, from forging to finished state, in correct proportion among the various roughing and finishing operations. Sufficient stock should be left following the roughing—depending on the subsequent amount of heavy cutting—to enable correction for distortion and inaccuracies without too great a reliance on the straightening press or fixture. Insufficient stock removal, on the other hand, places an added burden on the "finishing" operations. Evidently only experimentation on each individual type and size of crankshaft in actual production can give the most satisfactory distribution of stock removal.

On this factor also depends to a large extent whether "semi-finishing" should be performed with grinding or cutting tool equipment. For roughing the mains, of course, special crankshaft lathe equipment is almost universally used. Packard uses a Wickes lathe with potchucks for the end mains, a Lodge & Shipley double-end drive for all others simultaneously, including cheeking. Dodge uses a duplex drive Wickes for the center main and cheeks, and a LeBlond center drive with air chucking and loading for the others. Reo uses a LeBlond automatic for the center, a double-end drive LeBlond for the 3, 4, 6 and 7 bearings, and a LeBlond center drive for the four outer bearings and their cheeks.

Wickes equipment, including a center drive for machining the ends, is used by Studebaker and Saginaw. Jackson also has some Fay automatics for roughing the front and rear ends. For a five-bearing eight-

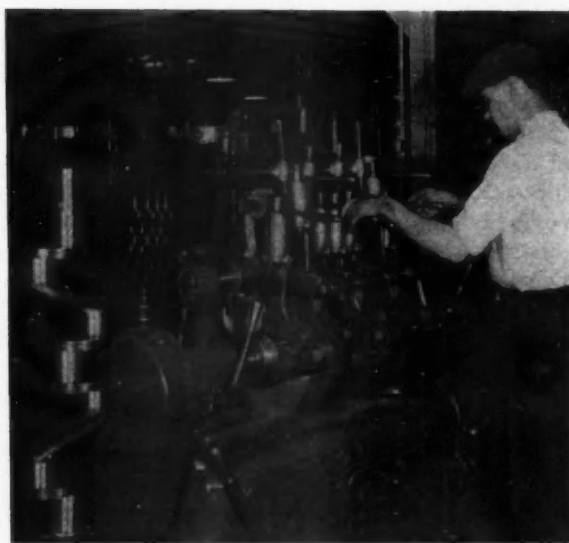
throw shaft, Wickes Brothers recommends machining the three center mains on a double-end drive lathe and the two ends on a center drive. So does LeBlond.

The type of equipment used for pin turning, of course, also has a bearing on the amount of previous work required on the main bearings. Dodge and Reo use the 5AC LeBlond hydraulic pin-turning lathe, turning all pins at once. Studebaker on the Dictator shaft uses the Wickes Multiplex hydraulic crankpin lathe. This type of equipment, designed primarily for high production runs, has two master crankshafts geared together in the same index and connected with a tool carrier which generates automatically the form of the master cranks on the shaft to be machined, which also is geared to the master shafts.

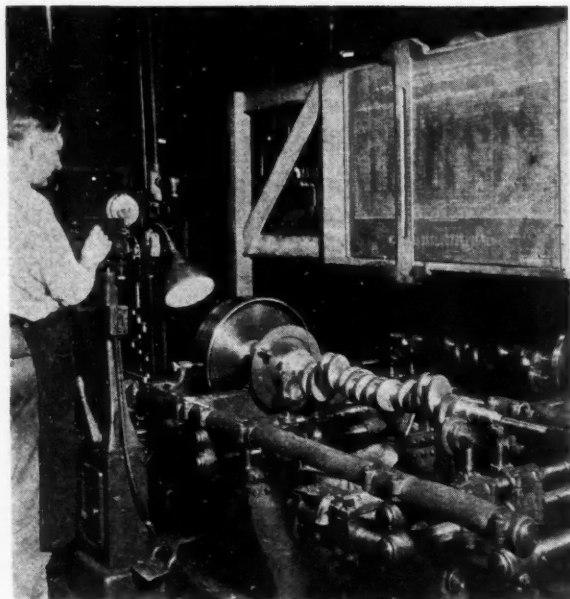
A third type of multiple-pin turning equipment is used by Packard for the crankshaft of the smaller eight. This machine, a Melling crankpin lathe, has a mechanical rather than hydraulic feed and is generally used more for finish turning or contouring. It has a single mast crank. For smaller production runs, it is customary to machine the crankpins in pairs, using potchucks and potchuck extensions to support the shaft as near the pins being turned and cheeked as possible.

While on an eight-throw crank, the multiple-pin turning type of equipment replaces four lathes, it does require one additional operation, the milling of the index flats on one or more crank throws to take the drive and to locate the shaft for index. Where the pins are machined in pairs, the index is taken care of by the chucking equipment itself, of course, since the index location is taken from the main bearings rather than the pins.

Multiple-pin turning equipment undoubtedly results in higher production capacity per man-hour and per square foot of floor space, and for that reason is used occasionally even for the machining of crankshafts on



Ford Motor Co. uses this Shraner lapping machine, equipped with abrasive paper on spools, for the finishing, simultaneously, of all pin and main bearings + + + + +



Gisholt balancing equipment for checking for dynamic balancing is widely used in the companies covered in this investigation. This particular view was taken at Studebaker and shows the President Eight crankshaft + +

which a total year's production, on the face of it, would not warrant the installation of this type of equipment with its relatively high cost and lack of flexibility. A change in crankshaft design may involve a rebuilding cost in these lathes approximating 50 to 60 per cent of the original cost of the equipment. It is a further essential that where this equipment is used, a bank of crankshafts be carried on the floor so that in case of trouble the whole line will not be shut down awaiting the repair of the crankpin-turning equipment.

Manufacturers who produce a variety of crankshafts, such as Jackson Motor Shaft and Saginaw Crankshaft Division (now being discontinued) are hardly justified in using this type of equipment unless they are assured of a sufficiently long production run on a specific crankshaft design to cover the cost of setting up the machine tool.

There is also some difference of opinion as to which type of equipment produces more distortion in the crankshaft during machining. Certainly the torque exerted on the shaft by the various forming, cheeking and filleting tools is greater on the multi-lathe than on equipment calling for machining of pins in pairs only. On the other hand, the necessity for setting up, say an eight-throw shaft, in four different lathes for the rough turning of pins may offer some possibilities for misalignment, etc. The driver location (index) may have something to do with the final result. Dodge machines the flats on the rear throw, locating the index from one end only, on to their five-bearing shaft. Reo, with a nine-bearing shaft, machines flats on the front and rear throws, locating thus from both ends. Ford drills holes in one of the throws for the use of dowel pins. With the use of multi-turning equipment it is also essential that ample supporting area be provided in the design of the crankshaft. Also maintaining the draft angles, in forging the throws, to a minimum is advantageous.

It is almost universal practice to correct for the distortion occasioned by rough turning the pins and pin cheeks immediately following this operation. In most

cases this correction takes the form of straightening. Cadillac does it by recentering only. Packard, Dodge and Studebaker both straighten and recenter. So does Ford in addition to heat-treating. Reo roughs out the intermediate mains before straightening, this operation having been saved until this point so that correcting for distortion due to the turning of the intermediates may not affect the preliminary pin turning and thereby multiply the error. As has already been mentioned, Saginaw straightens before roughing the two center pins so that less subsequent correction will be necessary and the pins during the roughing operation can be machined somewhat closer to the finished size without involving the possibility of being unable to "clean up" the shaft following the straightening.

From this point the sequence might become somewhat clearer by following through some of the individual shafts in their sequence of operations. After straightening and recentering, Dodge finish faces and turns the pins on a Walcott lathe close to final size. The shaft is then again straightened and put on ways for "static" balancing.

Following corrective grinding on the shaft to place it in static balance, the sequences follow, as far as main bearings and pins are concerned:

Finish grind No. 5 or rear bearing shoulders on plain Norton grinder.

Finish grind No. 3 main bearing and shoulder to size on plain Norton.

Finish grind No. 5 main bearing OD to size on plain Norton.

Finish grind No. 1 main (in all these grinding operations fibre steady-rest shoes are employed).

Finish grind No. 2 and 4 mains on plain Norton.

Straighten.

Finish grind all pin bearings and shoulders on Landis Hydraulic grinders equipped with indexing headstock, steady rest shoe and holder.

Dynamic balance on Olsen-Cowan balancer, one end at a time. These balancers are fitted with electrical contact protractors to indicate angular location of excess mass.

At Reo, following the roughing of the pins and straightening of the shaft to .010 runout (max.), the center, rear and front mains are reground on plain Nortons. The shaft is again straightened to assure alignment of these three key bearings and the pins are the finish turned at once on a Melling crank lathe. Next the intermediate six main bearings are turned on a Melling, and the shaft is once more straightened, this time to .003 in. max. runout, before grinding all the pins to finish size on plain Norton grinders with indexing headstocks and steady rests. Thirty-inch wheels are used on these grinders. Other operations on pins and mains follow in sequence:

Grind center main to finish size on Norton with 30 in. wheel.

Grind rear main to size.

Grind 6, 7 and 8 mains to size.

Finish grind front main, gear fit and fan pulley fit on plain Norton grinder with concave alundum grinding wheel.

Finish grind 2, 3 and 4 mains on Nortons.

Polish all mains on pins with hand polishing tool on Lodge and Shipley lathe.

Straighten after assembling counterweights.

Balance on two Gisholts, drilling for balance on a two-spindle Leland Gifford drill.

Hone all pins and bearings on Shraner hone.

At Ford, following the heat-treat, which consists of a heat, quench, and draw, and serves the double purpose of relieving strains and increasing the brinell, the shaft is checked for straightness (main bearings) on a three dial indicator equipped press. On the mains and pins the procedure is then as follows:

Semi-finish grind rear main bearing, from which alignment of other bearings will be taken.

Cut off front end of shaft, drill, tap and recenter.

Semi-finish grind center main.

Semi-finish grind front main.

Regrind rear main.

Semi-finish turn the four pin bearings on multi-pin lathes.

Straighten to .001 in. max. runout.

Finish grind 1 and 4 pins on double wheel hydraulic grinders with 36 in. wheels. Cutting speed is 6500 ft. per min. Diameter is held by integral indicator to .001 in., with .006 in. tolerance for width.

Finish grind 2 and 3 pins in similar fashion holding to .002 in. for plane and throw, and .0003 in. for index.

Straighten to .002 in.

Finish grind center mains.

Straighten to .001 in.

Finish grind rear main.

Finish grind front main.

Dynamic balance flange end on Gisholts at constant temperature, drilling hole in contour diameter for balance, on drill equipped with micrometer depth indicator reading to .001 in.

Static balance (for front end) on cylindrical bar ways. Drill, to correct for unbalance, in front throw.

Check for balance on rheostat controlled machine equipped with vibration indicator. Speed increased in steps.

Hone all bearings on Shraner hone at 120 r.p.m., both rotating and oscillating the shaft.

Polish mains and pins with polishing paper, automatic feed on Shraner.

All grinding wheels for finish grinding at Ford are redressed every 15 to 25 bearings with the built-in abrasive dressing wheels. The method of balancing the Ford shaft is quite interesting. The first operation of course virtually consists of setting up a couple with forces acting at the ends of the shaft to oppose existing unbalanced couples. The balancing operation itself, however, indicates only the necessary force at the rear or free end, the other half of the couple being located and indeterminate at the front or fixed end of the shaft. Following the drilling of the free end, it is obvious that a static balancing of the shaft, and the introduction of the necessary free force to oppose the unbalance, by drilling at the front end, will also result in completing the balancing of the shaft for couples.

The Packard shaft, it will be remembered, had the rough turning of the pins performed relatively early in the machining sequence. This roughing was followed by cam-contouring the cheeks on a Melling lathe and turning the clearance angles on both sides of the cheeks on a Lodge and Shipley with 3-jaw universal chuck and

roller steady rest. The heavy machining having now been completed on the Packard shaft, it is straightened, cut off to length and recentered at both ends, a LeBlond turret lathe with 3-jaw universal chuck and roller steady rest being used for the latter operation. Packard then semi-finishes the main bearings, finishes the pins, and then finishes the mains, in the following sequence of operation:

Finish face all main bearing cheeks on Lo-Swing lathe with multi-facing fixture.

Rough grind center main diameter and width on plain Norton with side dressing (diamond) attachment.

Rough grind No. 1 main, ditto.

Finish grind rear main and finish grind its width, ditto. There are steady rest shoes on these grinders to reduce machining distortion.

Finish turn intermediate six bearings on Wickes double end drive lathe with roller steady rests. Location, of course, is from front rear and center mains.

Finish face all pin cheeks on Melling lathe with pot-chucks and roller steady rests.

Finish turn all pin bearings on Melling crankpin lathe.

Straighten.

Finish grind center main on Norton grinder with steady rests having both upper and lower shoes.

Finish grind four intermediate bearings (2, 4, 6 and 8) on Norton grinder with closed type steady rest. All these grinders are equipped with Pratt grinding gages. Clamping devices are of the roller center type.

Finish grind No. 3 main bearing, ditto.

Finish grind No. 7 main, ditto.

Finish grind No. 1 main, ditto.

Finish grind No. 9 main, ditto.

Straighten.

Semi-finish grind, and finish grind all pin bearings on Norton pin grinders equipped with left and right-hand holding fixtures, spacing table, indexing fixtures, and diamond dressing attachments for grinding wheels.

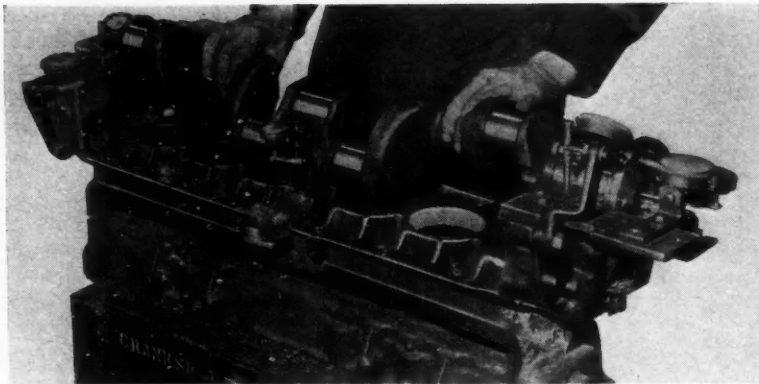
Dynamic balance on Gisholts. Drill for balance (each end separately).

Recheck for balance on static ways. If necessary re-balance on Gisholts. No correction for static unbalance is actually made.

In view of the fact that Cadillac employs no



Reo uses this Melling crankshaft lathe for simultaneous finish turning of all main bearings, except the two ends and the center main



Chevrolet uses part of an actual crankcase and cylinder block for an inspection fixture to check the alignment of main bearings + +

straightening operation at any point in its crankshaft machining, the sequence of operations used by this company is of particular interest. Following the rough turning of the pins, the ends of the shaft are sawed to length and the shaft is recentered to the end bearings. Next the collars at the main bearings are shaved on a lathe, with steady rests behind the bearings, this operation being largely intended to save wear on grinding wheels. Using the new centers, the rear, front and intermediate bearings are rough ground in turn, this operation being largely in the nature of a stock removal to correct for distortion. Again to save grinding wheel wear, the cheek faces are next turned, and the shafts are then transferred to a crankpin lathe for finish turning all pins. In this operation about .030 in. of stock is removed. While this is the second turning operation on the pins it is really only the first sizing operation, since the first is intended largely to machine strains out of the shaft by the removal of surface stock. Following are the remaining operations on main and pin bearings in sequence:

- Rough grind pins in one set up, using indexing fixtures and spacing table type grinder.
- Mill chamfers on cheeks on miller.
- Semi-finish grind pins, all in one set-up.
- Semi-finish grind main bearing.
- Finish grind pins, all one grinder. The use of three grinds for the pins instead of two reduces the tendency to distort the shaft by smaller stock removal per grind.
- Grind all mains in one setup, with steady rests at each bearing.
- Hand lap with abrasive paper on lathe (polishing).
- Balance on General Motors balancing machine. This is done with
 - a. one end free.
 - b. other end free.
 - c. both ends free.
- Drill for balance. The gage dial (depth) indicator on the drill is graduated to correspond with the balancer reading.

There are as many other variations in the methods of finishing a crankshaft today as there were companies included in the survey. Certainly no general conclusions as to proper sequence of operations can be deduced from a composite study of the operations performed by all the companies taken together.

While lapping, honing and polishing of bearings is frequently added, grinding might well be considered as representing the universal method of finishing a crankshaft. Studebaker and a number of other companies prefer the plain type grinders for roughing, the hydraulics for finishing the pins. A counter argument to this is based on the chatter which the oil gear pump

tends to set up. The larger, 30 in. and 36 in. wheels are also favored for the final grinding operations, for obvious reasons.

The major troubles encountered in grinding, of course, are taper and out of round. Such inaccuracies are often caused by inaccurate adjustment of the screw of the back rest. A point to be remembered in dressing grinding wheels to reduce the chances of grinding tapered bearings, is that the finishing cut of the diamond or abrasive wheel should always be from the same side.

It has frequently been found necessary, to obtain grinding accuracy, to warm up grinders for a considerable period before doing any actual work. One company runs its grinders an hour before starting production to warm up the bearings, etc. A quite satisfactory way to reduce this warming up time has been found to consist of flooding the bearings with heavy oil when starting up. Cadillac has a minimum of clearance in its grinder bearings, running them quite hot, so that this company has very little trouble due to slow warming up.

Norton suggests the following sequence for finishing crankshaft bearings:

- Rough grind main bearings to semi-finished size.
- Check for straightness.
- Finish grind pins or rough and finish grind, depending on previous turning tolerances.
- Finish grind all mains.
- Lap all pins and bearings.

What lies ahead in crankshaft production? Will a machine tool be developed capable of completely machining a crankshaft at one setup—and if it is would anyone use it? Will machine turning be entirely eliminated and replaced by only grinding, say in three steps from the rough? Will new cutting materials make grinding unnecessary? There are all possibilities, but at present only that. What seems to be needed more than anything now is development in fixtures, tool holders, tool forms, etc., to reduce some of the present production troubles, which are the primary reasons for the vast multiplicity of operations required to machine a crankshaft.

Design can also help materially. A slightly longer shaft may reduce materially the cheeking operations required, and the distortion occasioned by heavy stock removal on the cheeks. Research on forging, heat-treating, and the development of accurate centering devices would help materially in enabling the production of forgings requiring less stock removal. The opportunities for cost reduction are almost unlimited in spite of all that has been done by the production man and the machine tool builder, and the next few years should continue to show remarkable progress along the lines of lower costs and better crankshafts.

Majority of New Features at Paris Salon Shown by German and Austrian Makers

By

W. F. Bradley

Nitralloy steel is finding more use for engine accessory parts.

Means of preventing wheel wobble adopted by several exhibitors + + + + +

GERMAN and Austrian makers supplied more new models and more departures from accepted practice at the Paris Salon than the manufacturers of any other European country. The 150-200 hp. straight-eight Mercedes, produced by the Daimler-Benz Co., while normal so far as its general lines are concerned, combines a number of interesting refinements. This is a valve-in-head engine with rocker arms. A nine-bearing crankshaft is used, and the cylinder head is detachable. It is intended to build this car either with or without a supercharger, the power output being 150 hp. without the blower and 200 hp. with it, at an engine speed of 2700 r.p.m. Cylinder dimensions are 95 by 135 mm. (3.74 by 5.31 in.).

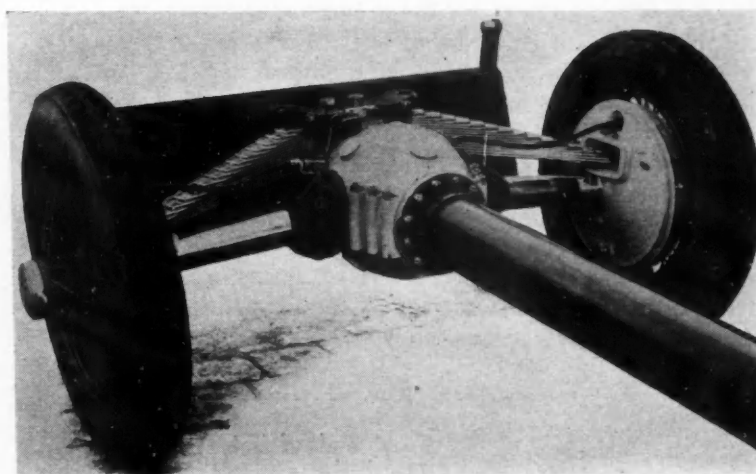
In this new model, the Rootes-type blower, geared up in a ratio of 1 to 4, is placed horizontally behind the timing gear housing and is engaged by means of a clutch. A feature of the arrangement is the provision for taking in either hot air from under the hood, or cold air from below the engine, and passing it through channels forming a part of the supercharger housing, whether the blower is used or not. The air filter, not visible externally, is combined with the supercharger housing. A multi-jet carburetor is used, with the intake manifold heated from the exhaust, the exhaust by-pass being connected to the throttle, to give the greatest amount of heating when idling. There is thermostatic control of the circulating water, all of which is by-passed through the jackets until a proper working temperature has been attained.

Three oil pumps are fitted. The main pump feeds the crankshaft and connect-

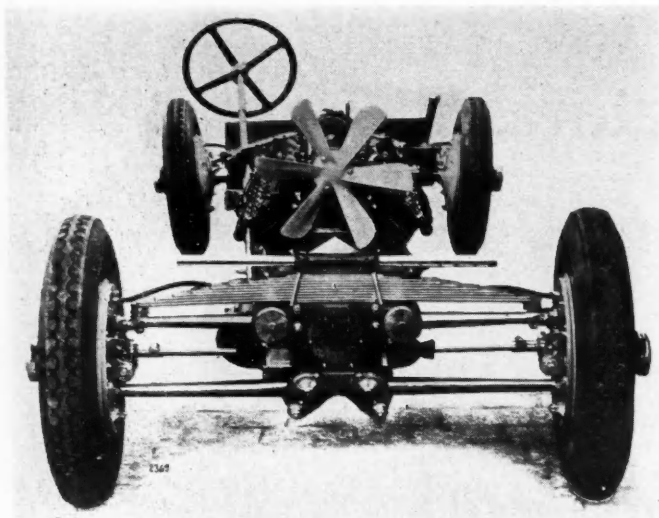
ing-rod bearings, a second pump circulates the oil through a purifier, and the third pump, which is of big capacity, is used for returning excess oil from the front to the rear of the crankcase when descending a steep hill, or on sudden application of the brakes. Dual ignition is fitted by magneto and battery. The generator and magneto are in tandem on the left side of the engine. A diaphragm type of gasoline pump is driven off the camshaft and is placed just back of the magneto.

To assure a cool dashboard and to prevent fumes reaching the driver's compartment, a hollow air-tight dashboard is fitted, this having an inlet at the base on the left-hand side and an outlet on the base at the opposite side, connected up to the carburetor air intake. Internal baffles cause the air to circulate through the dashboard chamber before reaching the outlet, thus maintaining a low temperature and preventing the passing of fumes.

The feature of the transmission is the adoption of the Maybach type of relay, with vacuum control, which gives two ratios for each of the three forward speeds.



Tatra rear axle with independent springing



Tatra independently-sprung front wheels

A device to prevent shimmy has been incorporated in the left front spring. On both sides the shackles are at the rear, but while the right spring is pivoted, the one on the steering side has an eccentric mounting, thus allowing of a slight longitudinal movement, the amplitude of which is limited by an inclosed and adjustable coil spring behind the shackle.

Ball bearings are fitted at the base of the steering pivot and taper roller bearings at the head of the pivot. Steering arms are bolted to the knuckles. Hydraulic shock absorbers are fitted, those at the front having their attachment to a stud forged with the axle as near as possible to the steering knuckle. Centralized chassis lubrication is used, and there is a separate pump for feeding the universal joint at the head of the torque tube. The chassis has a wheelbase of 147 in. and a standard track.

Two cars, the 12-cylinder Tatra and the straight-eight Austro-Daimler, have a tubular backbone chassis. The Tatra has the four wheels sprung independently. Its powerplant consists of a 12-cylinder Vee engine of 75 by 113 mm. (about 3 by 4½ in.), the two blocks being carried on an aluminum crankcase. The camshaft is in the angle of the two banks of cylinders and operates horizontal valves through followers. The arrangement gives a turbulence-type of combustion chamber. Connecting rods for one block of cylinders are articulated to those of the other block. Exhaust and intake manifolds are combined and the two carburetors are outward, directly above the cylinder blocks. In the central axis of the engine there is a shaft driven from the timing gear having the radiator fan on the front and the electric generator on the rear. Clutch and transmission are bolted to the rear face of the crankcase. The aluminum dashboard forms a part of the transmission housing. A big diameter tube connects the transmission with the differ-

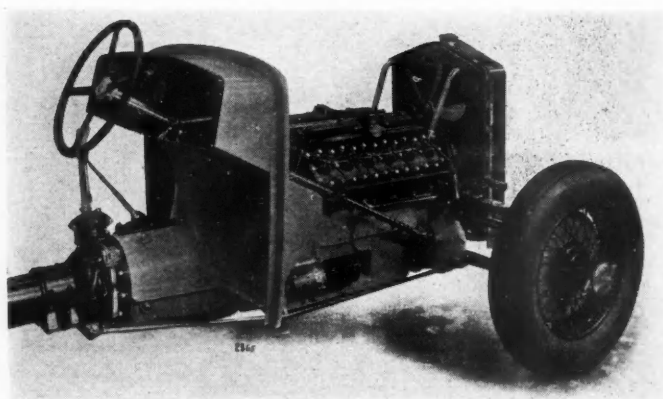
ential housing, and from this latter two tubes with a spherical attachment at their inner ends pass to the road wheels. A bracket on the rear of the differential housing receives the thick end of a pair of quarter-elliptic springs. This bracket also carries the gasoline tank.

At the front end a transverse spring is used, together with four links forming two parallelograms. There is a separate steering arm to each steering knuckle.

As a chassis the Austro-Daimler tubular construction is not new. It is distinctive in having normal channel side rails at the front, with a normal type axle. The tubular construction begins back of the transmission, and only the rear wheels are sprung independently. The straight-eight engine of 80 by 115 mm. (3.15 by 4.53 in.) is a new job, with aluminum cylinders having detachable liners. The detachable head carries vertical valves operated by an overhead camshaft driven by chain and having the fan on the front end and water pump on the rear. The pump housing projects through the aluminum dashboard. Lubrication is on the dry sump principle, with the oil contained in a tank forming an integral part of the aluminum dash. There is a big-capacity, easily-detachable filter set in the tank. A Stromberg downdraft carburetor is used. Suspension at the rear is assured by a very broad transverse spring, with a second and much shorter spring under it. Lockheed brakes are a part of the equipment.

The Maybach 12-cylinder 425 cu. in. engine, of 86 by 100 mm. (3.42 by 3.94 in.) bore and stroke, is a Vee type with valves in head operated by rockers. The feature of this car is the use of the Maybach over-gear in conjunction with the three speeds provided by the transmission. Operation is by vacuum and a button on the steering wheel, the change from high to low ratio being made without declutching.

Voisin continues his 12-cylinder sleeve-valve engine, with practically no changes so far as the powerplant is concerned. It is now fitted in an underslung chassis with a tunnel passing through the body. The Cotal



Front end of Tatra 12-cylinder chassis

Austro-Daimler straight-eight aluminum engine. (Note treatment of dash)

planetary magnetic relay is now standard on the firm's 13 hp. six-cylinder model, while a straight transmission is found on the 12-cylinder jobs.

The only 16-cylinder engine in the show is one with two vertical banks of eights, produced by the Bucciali Brothers, and having all the appearance of two engines united by gearing. In reality, while the cylinder blocks are vertical, the cylinder bores of 72 by 120 mm. (2.87 by 4.78 in.) are at an angle of 22 deg., and a single five-bearing crankshaft is used. Cylinder blocks are sufficiently offset to allow connecting rod mounting side by side. Aluminum alloy (Alpax) with iron liners is used for the cylinders.

Bugatti has built a 16-cylinder 183 cu. in. engine as a fast sports car, the design following modern racing practice, but the car was not on exhibition. The only other European 16-cylinder engine is the Italian Maserati, but this also is a racing job and is not in regular production.

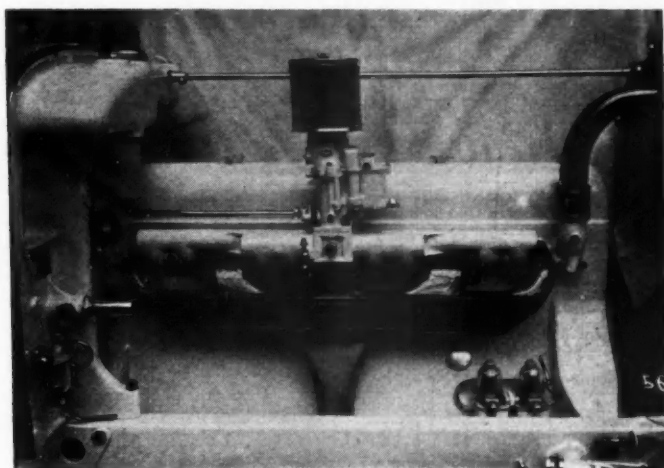
Use is being made of American engines among the smaller French car manufacturing firms, as well as by truck manufacturers. The passenger cars with Lycoming engines are Rolland-Pilan with a six and an eight; Bignan, Delaunay-Belleville, each with a six and an eight, and Georges Irat with an eight only.

Nitralloy steel is finding a more extended use for accessory parts of the engine, but less progress is being made in major parts. Its use as cylinder liners is confined to those engines having aluminum blocks, the only ones of this type in France being Hispano-Suiza and the Ballot built under Hispano-Suiza license. The French Talbot has dropped the use of nitralloy liners on the straight-eight, the reason apparently being that this firm uses a built-up piston with aluminum head and iron skirt, and difficulties have been experienced in using cast iron in frictional contact with nitralloy steel. Formerly the crankshaft of this engine was of nitralloy steel with duralumin rods mounted direct. This has been changed to steel rods with white metal lining with satisfactory results. Aries, on the other hand, has produced a 122 cu. in. four-cylinder sports model with a four-bearing nitralloy shaft having duralumin rods mounted direct; piston pins are also nitralloy direct in the rods. The objection found in the use of duralumin rods direct on the shaft is that owing to expansion the rods have to be set up so tight that the engine is stiff when cold, to avoid too much clearance and consequent noise, when hot.

As a preventive of wheel wobble, several makers are using an elastic mounting of the front spring on the steering side of the chassis. There is an example of this in the elastic spring shackle produced by Delaunay-Belleville and adopted by Packard. The Mertens "Shimex," which was used last year on one of the Mercedes models, allows of free movement of the springs at each end and has elastic radius rods, by means of which there can be a slight fore and aft movement of the axle. On the latest model straight-eight Mercedes the semi-elliptic spring on the steering gear side has an eccentrically mounted pivot, which allows of a longitudinal movement of the axle, probably of about two millimeters in each direction, this movement being limited by a coil spring carried in a housing behind the rear shackle. On the straight-eight French Talbot, shackles are at the rear, but in addition there is a short shackle on the steering gear side, working between two adjustable coil springs which limit its movement. The same result is sought on the Horch in a slightly different manner.

American silent third transmissions were used on a certain number of French cars immediately after their appearance on the market, but at the present time practically all makers are building their own transmissions with a silent indirect gear. Where this is not done the third is almost invariably ground to secure a degree of silence. The Hotchkiss transmission, which is of the internal gear type, is distinctive by reason of its mounting, which, as shown in the drawing, gives a more compact transmission, with decreased distance between centers, and a consequent greater rigidity. The use of "needle" bearings is a feature of this transmission.

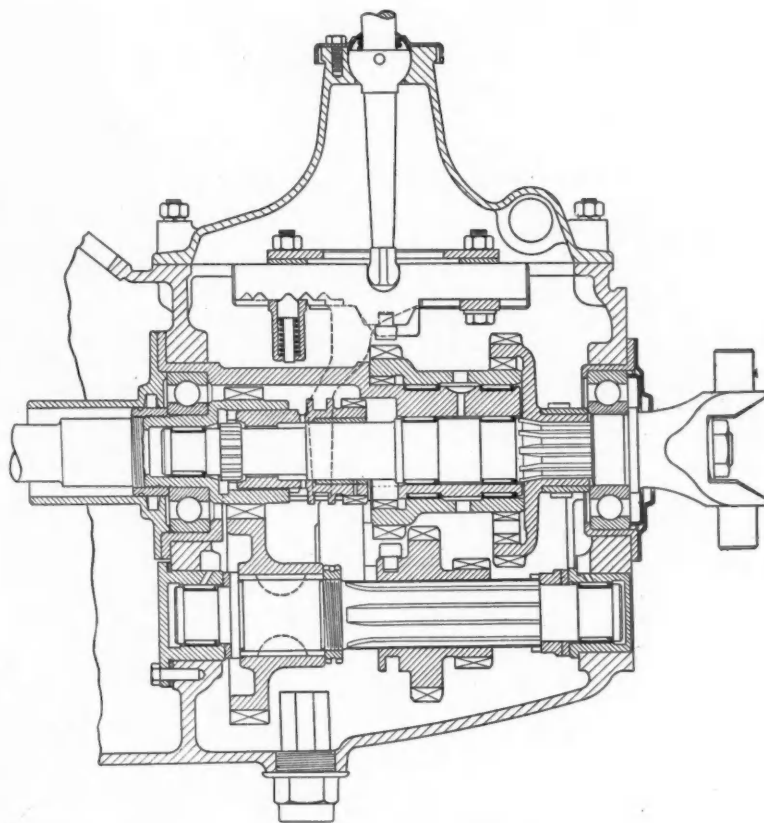
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Bucciali 16-cylinder small-Vee engine

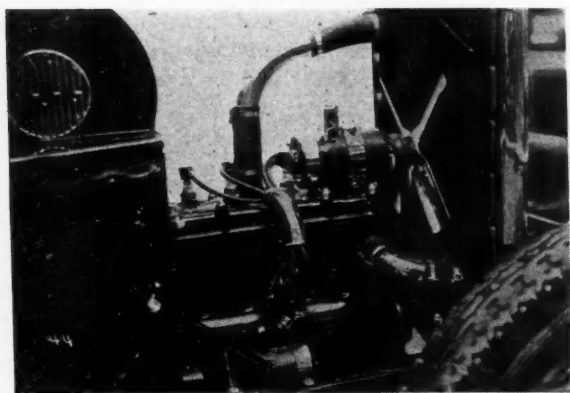


In the Hotchkiss internal-gear transmission, a section of which is shown here, the spool gear (near the rear end) is mounted on a cylinder which is supported from the forward end of the case, the cylindrical part being bored out eccentrically for the driven shaft and connecting by a crescent-shaped bridge with the flange bolted to the bearing boss at the forward end of the case + + + +



There is a very decided movement in favor of the hydraulic shock absorber to the detriment of the friction type. The Lovejoy is now standard equipment on a number of leading European makes. Repousseau, who manufactures what was originally known as the Hartford friction type shock absorber, has purchased the Dufaix adjusting device, enabling adjustment to be made while the car is in motion. This is obtained by a cam action on the assembly bolt, with a wire cable connection brought up to the instrument board.

European motorists are only slowly being weaned away from the small-bore, high-speed engine. There is an increase in average piston displacement, but engineers still complain of the resistance of the sales department to bigger displacement on account of the increase in the annual tax. Buyers have not yet been convinced that the amount of the tax is a very small proportion of the total cost of automobile maintenance. Of the seven biggest selling jobs in France, produced by Citroen, Renault, Peugeot, Mathis, Chenard &



Powerplant of the new small Mathis car which is to be produced in this country + + +

Walcker and Berliet, the average piston displacement is less than 122 cu. in. The biggest among these cars is that of the Chenard & Walcker, with 134 cu. in.

Oxygen Concentration Research Developments

IN a paper presented at the meeting of the Division of Petroleum Chemistry of the American Chemical Society held in Cincinnati, Ohio, recently, Lloyd Withrow, Wheeler G. Lovell and T. A. Boyd described measurements made of the oxygen concentration in gases withdrawn from the cylinder of a gasoline engine with a new and improved sampling valve which was located at different places in the combustion chamber and opened at different times during the combustion of the charge.

These data show a narrow combustion zone proceeding through the combustion chamber at a finite rate. The progress of the zone is slower near the walls than through the middle portion of the combustion space. Over the range investigated it is increased with engine speed and unaffected by spark timing.

The presence of "knock" in the range investigated did not affect the movement of the zone during the first three-quarters of the distance traveled, but the knock occurred during the time that the last part of the charge burned. The elimination of the knock by lead tetraethyl did not affect the movement of the combustion zone in the first portion of the combustion space.

Economic Principles Injected Into Annual Production Meeting

(Continued from page 607)

steel which is in the Brinell range of 200 to 260. When cutting soft steel it has been noted that a small fin appears on the cutting edge and that this breaks off and takes with it a small portion of the carbide tip. This action is believed to be caused by the heat generated being sufficient to raise the temperature of the extreme cutting edge to a point when actual alloying takes place between the chip and the carbide cutting edge. The alloy produced is brittle and breaks off, thus causing early failure. It is interesting to note that the ill effects above mentioned can be overcome with the present alloys by increasing the size of the tip to an extent which will permit the heat being conducted away rapidly, so that the alloying temperatures are never attained under ordinary working conditions. We also find it advisable to remove the machining strains in the tool shanks before mounting the tungsten carbide tips. These strains should be removed after the machining of the recess is completed by packing the shank in a charcoal pot and heating to approximately 1750 or 1800 deg. Fahr. and allowing it to cool slowly. This procedure seems to eliminate most of the difficulties we have experienced in the tips cracking after the bond, which cracks do not appear until the tips are finish ground."

After discussing the properties of the present grades of cemented-tungsten-carbide tool tips and commenting on the present research program which contemplates further study along this line, Mr. McCoy sums up the future developments in the following two statements: (1) that the development of new physical properties to meet certain specific applications by the use of binders other than cobalt is one

possibility, (2) that the development of a material possessing diverse physical properties by means of regulating the size of the carbide particles which are to be bound with alloy binders is the other.

Because of the general interest in this subject of cemented-tungsten-carbide tools, this paper provoked an unusual amount of discussion. A formal written discussion was sent in by Roger D. Prosser of Thomas Prosser & Son. He was particularly interested in the explanation of the formation of a fin on the cutting edge and agreed that it could be avoided or overcome to a large extent by the use of a larger tip, as stated in the paper. However, he said that in their experience they find that the light cutting oil is often of great assistance in eliminating this trouble. Among others participating in the discussion which took place were W. W. Nichols, W. E. Smith, E. R. Smith of Seneca Falls Machine Co., and R. L. Templin.

In talking to some of the important executives at the Production Dinner, the writer found a most encouraging sign in their enthusiasm of the results of these technical sessions. The possibilities are that the next production meeting will have their support to such an extent that they will urge their own men to attend every session, for it has been demonstrated that the ideas gathered at these meetings are of real practical significance and can be applied by the production man in his every-day problems.

The Production Meeting Committee of the Production Activity this year consisted of the following: Chairman, J. Geschelin, *Automotive Industries*; E. P. Blanchard, A. R. Fors, Erik Oberg, V. P. Rumely, F. W. Stein and C. C. Stevens.

"Submerged Honing" for Cylinder Bores

TO perfect the operation of honing, the Chrysler Corporation has devised a method to keep the cylinder blocks at constant temperature during the honing operation and also to keep the hones clean and free from dust which results from the abrasion of the hones against the cylinder walls.

In the honing operation of the new Chrysler Eight and Imperial Eight engines the possibilities of heating, of distortion, or of "loading up" the hone are minimized by submerging the block in kerosene during the honing operation. Kerosene circulates all around the hones and the cylinder block during the entire operation, keeping the block at constant temperature and at the same time flushing the hones and preventing the "loading."

When the platform is lowered into position for the

hones to start operating, the cylinder block is entirely submerged. When the platform is lifted after the honing operation is complete, the kerosene drains back to the main supply and is carried off through the circulating and cleaning system. The entire circulating system is installed above the honing machine and off the floor so that no more floor space is occupied than would be the case with the ordinary honing installation.

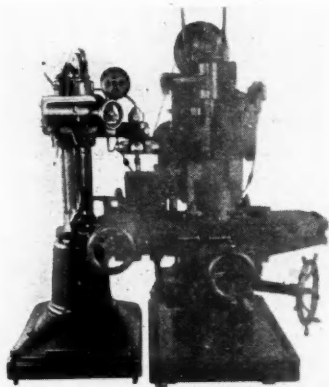
It is provided with separators and cleaning pumps which keep the supply of kerosene free from abrasive particles and maintains it at the right temperature.

A great improvement in the quality and accuracy of the bore has resulted from this process. Moreover the life of the honing stones as well as the speed of the work have increased.

NEW DEVELOPMENTS—AUTOMOTIVE

Transcribing Attachment for Vertical Milling Machine

A TRANSCRIBING instrument for use in all kinds of profiling work has been added by the Walcott Machine Company, Jackson, Mich. This machine is designed for use with any



vertical type milling machine, and, according to the manufacturers, converts the latter into a speedy, die sinking machine. Because of its unusual simplicity and speed, it is claimed that even the most inexperienced operator can make all kinds of dies and metal

molds by means of this instrument in less than half the time formerly required by skilled die makers.

Where used in connection with a knee type milling machine, the instrument can be rolled from one machine to another inasmuch as it is mounted on ball bearing castors which can be utilized simply by releasing the corner leveling screws. Because of this feature, every vertical type milling machine in the shop can be used for profiling work.

It also can be adapted for use on milling machines having heads that move vertically. On such installations, the base is discarded and the instrument is mounted on the vertical head.

The floor space required 32 in. x 43 in. The net weight is 2500 lb.

Brown Indicating Pyrometer Controller

THE Model 801 Indicating Pyrometer Controller which can be supplied as an automatic control pyrometer, resistance thermometer, tachometer, or CO₂ meter has been added by The Brown Instrument Company, Philadelphia, Pa.

Some important features of this instrument are:

Reading observed directly on 6-in. scale; index on scale for setting to exact control point; control point instantly and easily adjustable; all wiring terminals and motor inclosed. No danger when used in the presence of explosive or inflammable gases; mercury switches up to 30 amperes capacity, eliminating the necessity of relay equipment. Make and break occurs in

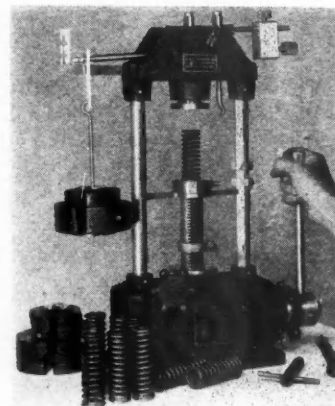
sealed glass tube. No danger of spark causing explosion; suitable for "on and off" or "three position" control through switches, valves, dampers, etc.; available with patented safety device which opens furnace circuit if thermocouple or wiring fails, preventing burning out furnace.

The control mechanism of this controller combines the basic principle of the Brown Automatic Control Recorder with the new feature of mercury contacts for breaking high currents.

Elasticometer Spring Testing Machine

A WEIGHT-OPERATED Spring Testing Machine, designed for quantity production, which weighs springs in the position of balance, is marketed by the Coats Machine Tool Co., Inc., 111 West Fortieth St., New York City.

With the R-80 Elasticometer Spring Testing Machine the procedure is as follows: With no weights on the hook, the balance beam is first brought to the zero mark by the sliding balance weight and micrometer adjustment screw. The



spring is then placed on the lower compression plate and the load is placed on the weight holder, exactly as shown in the illustration. (The ratio of the scale is 10:1 so that the maximum weight load applied at the end of the beam cannot exceed 17 lb.) The hand lever is now pulled forward until the pressure exerted by the spring against the upper compression plate has returned the balance beam to zero. In this position the rack may be locked by a turn on the star wheel and the compressed length of the spring may be read off the length scale engraved on the right-hand pillar and graduated in 1/32 in. It should be understood that, in the position of balance, the distance between the compression plates (or extension hooks) will always equal the length indicated by the length scale indicator which moves in unison with the lower compression plate to which it is attached.

To obtain production rates, weight tolerance markers may be set on the beam or length tolerance markers on the vertical length scale. The compression stroke is set by the adjustable stop near the hand lever, whereas the ring around the rack limits the tension stroke. The weighing

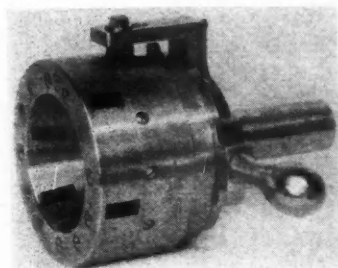
PARTS, ACCESSORIES AND PRODUCTION TOOLS

mechanism consists of a number of knife-edges made in one piece of special steel, hardened and ground complete on the machine.

Two standard sizes of weight-operated machines are available: The R-25 machine for loads from ¼-oz. to 56 lb. with length capacity up to 4 in. and the R-80 type shown for loads from ½-oz. to 170 lb. with length capacity up to 8 in. The standard R-80 machine shown weighs approximately 70 lb. Both machines are suitable for compression and tension tests.

Eastern H & G Light Duty Die Head

A NEW die head by the Eastern Machine Screw Corporation, New Haven, Conn., known as No. 10 Style D Light Duty type for turret lathes, has been added to the H & G line. It has been designed especially for cutting threads of large diameters where the pitches are relatively fine. The die head has a diameter from 2 in. to 3 in. in pitches not coarser than 10 and for lengths not over 2¼ in.



The No. 10 head has six chasers in a set, operated on the well-known H & G principle. The chaser cams, solidly supported by the body, engage diagonal slots in the chasers that not only support the chasers directly over the cut, but also serve to open the chasers in a positive manner without individual springs.

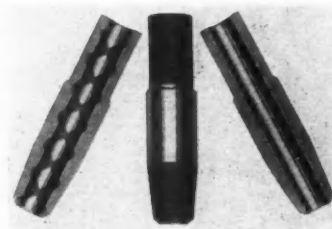
The die head has a detachable shank which can be supplied in various diameters. The length of thread adjustment is carried on an arm from the shank. Adjustment for pitch diameter is by means of a micrometer screw on the front face. Adjustments for length of thread and for pitch diameter may therefore be made with great rapidity and ease.

This unit weighs only 21 lb. as against over 40 lb. for a regular 3 in. die head. Outside diameter is 5¾ in. with an overall, not including shank, of 4 7/16 in. The chasers are easily removed radially by simply depressing a stop plunger. A friction device that holds the chasers in place adds to the ease of installing them.

Thompson Valve Guides

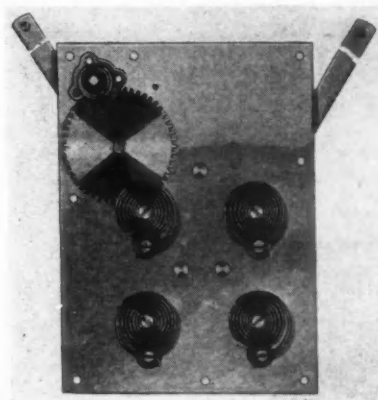
A NEW line of valve guides made by Thompson Products Corp., Cleveland, Ohio, will be on exhibition during the N.S.P.A. and M.E.A.

shows. There are two types of guide, plain and graphite. The plain guides are made of pearlitic iron alloyed with nickel and chromium. Nickel provides a compact, dense wearing surface and chromium contributes hardness. In external appearance the graphite guides are the same as the plain type, but the internal bearing surface has helical grooves cut in it, and graphite is compressed into the grooves to produce a self-lubricating unit. Both types of guides have a hardness of 90-95 on the Rockwell B scale, as compared with 70-80 for ordinary soft iron guides. They are core-cast rather than cast solid and drilled, which is claimed to give a more wear-resisting surface.



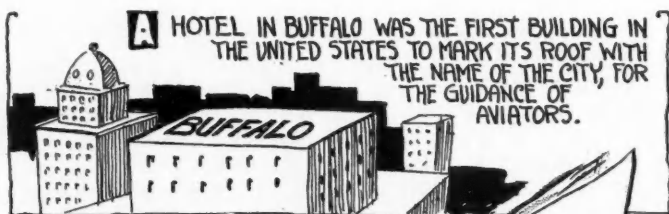
Heavy Duty Window Regulator

ANNOUNCEMENT comes from Ackerman-Blaesser-Fezzey, Inc., 1258 Holden Avenue, Detroit, manufacturers of Common-Sense window regulators, of a new model, No. 67, for heavy-duty work on motor buses and armored cars. The counterbalanced springs are adjusted at the factory to any desired weight up to 60 lb. on the 11-in. arms; more on the shorter arms. The arms are specially rolled to withstand excessive

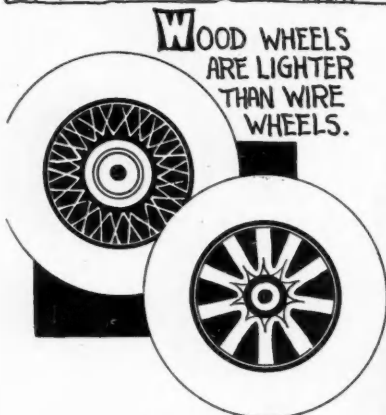


weight; the gears are high carbon steel and the pinions are treated for heavy duty. One of the features of this new regulator is that the handle can be located in practically any position, the illustration showing the standard position. When this type of regulator is used for armor plate glass, which is heavy and thick, the channel will be furnished according to the size of glass specified.

Automotive Oddities—By Pete Keenan



A HOTEL IN BUFFALO WAS THE FIRST BUILDING IN THE UNITED STATES TO MARK ITS ROOF WITH THE NAME OF THE CITY, FOR THE GUIDANCE OF AVIATORS.



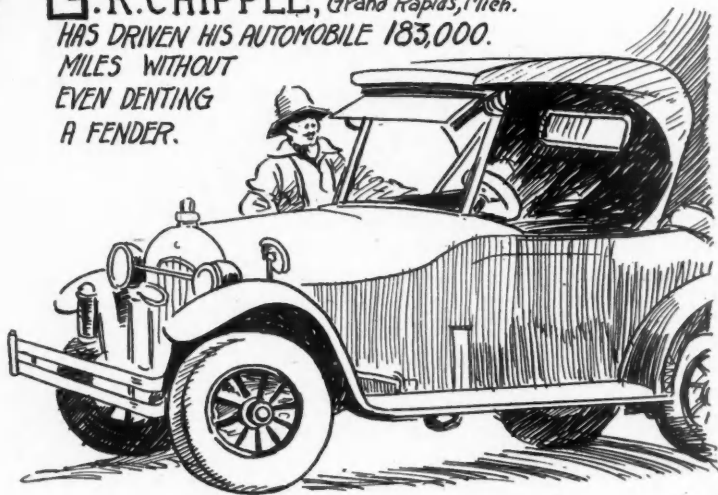
WOOD WHEELS ARE LIGHTER THAN WIRE WHEELS.



HENRY FORD DEVELOPED HIS FIRST IDEA OF A HORSELESS CARRIAGE ON THE BACK OF A SHEET OF MUSIC.



L. R. CHIPPLE, Grand Rapids, Mich. HAS DRIVEN HIS AUTOMOBILE 183,000 MILES WITHOUT EVEN DENTING A FENDER.



THE FIRST "FLEET" OF MOTOR TRUCKS WAS SOLD TO A ST. LOUIS NEWSPAPER BY B. A. GRAMM, WHO NOW HEADS THE COMPANY BEARING HIS NAME.



NEWS OF THE INDUSTRY

Service Sales Boost M.E.A. Parts Index

**Replacement and Repair
Volume Shows Increase
Over August Figures**

NEW YORK, Oct. 22—Increasing activity for preparing cars for winter driving, with the possibility that owners are going into the winter with older cars, has resulted in an increase in sales of replacement and repair parts and equipment, according to the business indices prepared by the Motor and Equipment Association.

The September index for service parts is 139 as compared with 132 in August and with 173 in September a year ago, taking January, 1925, as a base of 100.

Accessory sales by manufacturers set an index of 76 as compared with 60 in August and with 84 in September of last year.

Service equipment index is 105 as compared with 104 in August and with 147 in September of last year.

Original equipment index, on the other hand, shows a decline to 79 as compared with 87 in August and with 186 in September of last year and results in a decline in the grand index to 89 as compared with 91 in August and with 175 in September a year ago.

Wholesaler business during the month showed a favorable trend with an index of 120 as compared with January, 1928, at 100. This compares with 114 for August and 135 in September a year ago.

Julian Heads Rubber Exchange

NEW YORK, Oct. 22—The Rubber Exchange of New York has formally elected John L. Julian, a member of the Stock Exchange firm of Fenner & Beane, as its president, succeeding F. R. Henderson, who has been president since the organization of the Exchange in 1925. William A. Overton was elected vice-president and J. Chester Cuppia was reelected treasurer.

Col. Henderson Heads N.A.T.

NEW YORK, Oct. 22—Col. Paul Henderson, vice-president of National Air Transport, was elected president of the company. He succeeds F. B. Rentschler, who is also president of the United Aircraft and Transport Corp., of which N. A. T. is a division.

The News Trailer

By Herbert Hosking

TAMPA, FLA., Oct. 22—Seven motorcycles and one touring car have been burned out in the pace set by the motor coaches leading Tour No. 2 of delegates of the *Sixth International Road Congress*, who are making a motorcade tour of five Southern States before proceeding by train to Detroit. . . . At Waycross, Ga., M. Chain, acting president of the Permanent International Association of Road Congresses and the *Vicomte de Rohan*, president of the Touring Club of France, left their colleagues to proceed to Detroit ahead of the main party.

Sunday evening, Oct. 19, the visiting delegates were the guests of *Howard E. Coffin*, Hudson vice-president, at Sea Island Beach, adjoining his 68,000-acre south Georgia *Sapelo Island*. The island adjoining Mr. Coffin's is, by the way, owned by C. M. Keys, Curtiss-Wright chairman. The *duPonts* own land in the same neighborhood, and *Henry Ford* has recently purchased large holdings inland. . . . It has been suggested that if the matter were handled through the *N.A.C.C.*, they might be able to get a good price offer for the whole State of Georgia, and the towns could be renamed after several prominent automobile trademarks.

Limerock is not the name of a new mineral water; it is what makes the Florida roads good, though cheap. They have done wonders with the roads in this state in the last five years, and at a relatively low cost per mile for the subbase material. . . . Tell you about it later.

Advance-Rumely Reorganization

CHICAGO, Oct. 22—The first step in the reorganization of the *Advance-Rumely Co.*, manufacturers of farm implements, was effected when stockholders voted to accept the provisions of the 1929 Indiana general corporation law in modernizing the company charter. The action makes it possible for the proposed changing of existing preferred and common stock into one class of no par value shares.

Business Betterment Predicted by Leaders

**Automotive Delegation
Joins Chicago Meeting
On Industrial Outlook**

CHICAGO, Oct. 22—Predictions of the revival of business on a scale hitherto unknown and of betterment of the agricultural situation, and criticism of laws regulating business were voiced by speakers at the seventh Conference of Major Industries held today at the University of Chicago.

Representatives of the automotive industry included *Vincent Bendix*, president, *Bendix Aviation Corp.*; *William B. Mayo* and *William B. Stout*, aircraft division, *Ford Motor Co.*; *Albert R. Erskine*, president, *Studebaker Corp. of America*; *Walter P. Chrysler*, chairman, *Chrysler Corp.*; *Charles W. Nash*, president, *Nash Motors Co.*; *Charles E. Thompson*, president, *Thompson Products Co.*, and *Edward S. Evans*, president, *Detroit Aircraft Corp.*

Eight outstanding leaders of business and industries discussed the current situation in their individual lines of activity at the conference, held in Mandell Hall under the auspices of the Institute of American Meat Packers, in cooperation with the Chicago Association of Commerce and the Commercial and Industrial Clubs of Chicago.

The one-day meeting, which was followed tonight by a banquet, was divided into morning and afternoon sessions.

Robert Maynard Hutchins, president of the university, presided at the morning session, and *Oscar G. Mayer*, chairman of the committee on educational plans of the Packers' Institute, during the afternoon.

Hoover is Told Faith In Dirigibles Unshaken

WASHINGTON, Oct. 22—The recent disaster to the British dirigible R-101 has not shaken the faith of American advocates of lighter-than-air transportation, *Fred M. Harpham* of Akron, Ohio, vice-president of the *Goodyear Tire & Rubber Co.*, told President Hoover today.

Britain May Seek New Car Tax Basis

Prime Minister Hints Aid In Competing Against U. S.

LONDON, Oct. 21 (by cable)—Prime Minister MacDonald hinted at the Olympia Show today that the government might find a new formula for taxing automobiles which would enable British manufacturers to concentrate on large-bore engines and to compete on better terms with the United States in empire markets.

"Anything we can do to back you up, we will do," he told the manufacturers. "I am doing my best to find a good market for your cars."

The government has agreed on no formula thus far. Chancellor Snowden does not appear to care how the money is raised. The possibility is that a petrol tax will be imposed.

Automobiles here are taxed at the rate of \$5 per horsepower, which is calculated largely on the diameter or bore of the cylinders. Thus British manufacturers have been compelled to develop a high-speed engine of low power, which is unsuitable for use on colonial roads.

Hupp Reports Loss

DETROIT, Oct. 22—Hupp Motor Car Corp. has reported net loss for quarter ended Sept. 30 of \$458,388 compared with net profit of \$406,058 or 28 cents a share in the third quarter last year.

Net profit for nine months ended Sept. 30 was \$105,672 after depreciation, etc., equal to 7 cents a share on 1,512,092 shares, comparing with \$3,237,441, or \$2.25 a share, on 1,440,319 shares in first nine months of 1929.

Michigan Sales Gain

DETROIT, Oct. 23—New passenger car registrations in the State of Michigan during September totaled 8565,

General Motors Dealers Sell 75,805 Automobiles in September

NEW YORK, Oct. 20—General Motors dealers sold 75,805 cars to consumers in the United States during September, according to an announcement made today by Alfred P. Sloan, Jr., president. This compares with 124,723 cars sold in September last year and brings the third quarter sales to 242,378 as compared with 423,524 during the like period last year.

Total sales during the nine months were 900,207 cars as compared with 1,271,275 cars during the first nine months of last year.

Sales by General Motors Divisions to dealers in the United States during September were 69,901 as compared with 127,220 in September of last year. This represents a further decrease in dealer inventory during the month

consistent with the policy carried on throughout the year.

Sales to dealers during the first nine months were 896,329 as compared with 1,361,066 during same period last year.

Total sales to dealers, including Canadian sales and overseas shipments during September, were 78,792, bringing the total for the year to date to 1,008,597 and comparing with sales in September last year of 146,483, or a nine months' total of 1,675,721.

The following table shows sales to consumers of General Motors cars in Continental United States, sales by the manufacturing divisions of General Motors to their dealers in Continental United States and total sales to dealers, including Canadian sales and overseas shipments:

	United States		United States		Total Sales to Dealers, Including Canadian Sales and Overseas Shipments	
	Sales to Consumers		Sales to Dealers			
	1930	1929	1930	1929	1930	1929
Jan.	74,167	73,989	94,458	95,441	106,509	127,580
Feb.	88,742	110,148	110,904	141,222	126,196	175,148
Mar.	123,781	166,942	118,081	176,510	135,930	220,391
Apr.	142,004	173,201	132,365	176,634	150,661	227,718
May	131,817	169,034	136,169	175,873	147,483	220,277
June	97,318	154,437	87,595	163,704	97,440	200,754
July	80,147	147,079	70,716	157,111	79,976	189,428
Aug.	86,426	151,722	76,140	147,351	85,610	168,185
Sept.	75,805	124,723	69,901	127,220	78,792	146,483
	900,207	1,271,275	896,329	1,361,066	1,008,597	1,675,721

Unit sales of Chevrolet, Pontiac, Oldsmobile, Marquette, Oakland, Viking, Buick, LaSalle and Cadillac passenger and commercial cars are included in the above figures.

an increase of 1335, or more than 18 per cent over the total of 7230 registered in August and a decrease of 11,076, or more than 56 per cent from the September, 1929, total of 19,641.

Crude Oil Production Up

NEW YORK, Oct. 22—Daily average gross crude oil production in the United States for the week ending Oct. 18, according to the American Petroleum Institute, was 2,370,750 bbl.

Stutz Announces New Line and Stock Plan

INDIANAPOLIS, Oct. 22—Announcement of the 1931 "Twentieth Anniversary" line of Stutz cars was made here today coincident with a new stock plan to enable the Stutz Motor Car Co. to have additional working capital. The new models closely resemble last year's line with a great number of refinements and improvements. Fenders will be wider and sturdier. The cowl lights and bands have been eliminated to increase the appearance of fleetness. The hood also has been changed from a center panel type to a center hinge. All models are custom built and at new low prices.

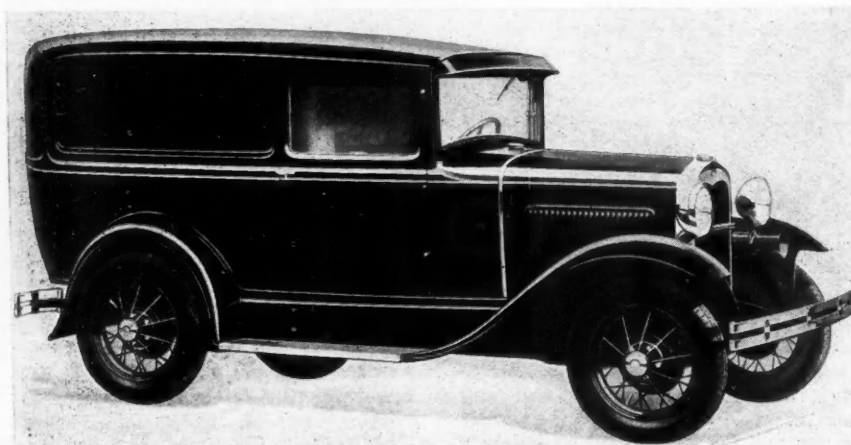
The stock plan as outlined by E. S. Gorrell, president, is for the issuance of 81,974 additional shares and a reduction trade of ten for one in order to keep the total number of outstanding shares below 400,000, the limit set by the present charter of the corporation.

Gorrell said that the firm expected to realize approximately \$1,130,000, of which at least \$600,000 will be cash.

Abbott is Promoted

Chester G. Abbott, general sales manager, has been appointed assistant general manager of the Hudson Motor Car Co. Mr. Abbott has been associated with Hudson for 15 years, rising from salesman to vice-president of the Henley-Kimball Co., Boston.

Ford De Luxe Model A Delivery Car



This commercial car, announced by Ford Motor Co. last week in Automotive Industries, resembles the Tudor sedan in design + +

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Oct. 23—Continuation of unseasonable weather last week had a depressing influence on trade, while there was nothing in the way of industrial developments to stimulate business. Naturally both wholesale and retail trade in clothing was retarded. The reduced prices of canned goods aided the grocery lines in making a better showing.

The Guaranty Trust Co.'s business index for September stood at 72.2, as against 73.0 for the preceding month and 102.2 for the corresponding month last year.

CHAIN STORE SALES

Sales of 52 store chains during September were 4.16 per cent below those a year ago. Sales of these same store chains during the first nine months of this year, however, were 1.65 per cent above those in the corresponding period last year.

EXPORTS

Exports during September amounted to \$318,000,000, the highest since May, as against \$437,103,000 a year ago. Imports amounted to \$227,000,000, as against \$351,304,000 a year ago. Exports during the first nine months of this year were 20.3 per cent above those a year ago, while imports were 28.5 per cent above.

CAR LOADINGS

Railway freight loadings for the week ended Oct. 4 totaled 972,492 cars, which marks a decrease of 207,455 cars below those a year ago and a decrease of 214,540 cars below those two years ago.

CONSTRUCTION

Construction contracts awarded during September, according to the F. W. Dodge Corp., amounted to \$331,863,500, as against \$445,402,000 a year ago. Contracts awarded during the first nine months of this year amounted to \$3,684,723,500, as against \$4,602,267,600 in the corresponding period last year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Oct. 18 stood at 82.7, as against 82.9 the week before and 82.3 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Oct. 15 were 23 per cent below those in the corresponding period last year.

STOCK MARKET

The stock market last week continued to show the falling tendency of the several weeks preceding. There were large declines throughout the list; over 300 issues registered new lows for the year, and the security price index of the New York Times broke through its low point for the collapse last October and November. However, the volume of trading was small. Call money remained at 2 per cent.

BROKERS' LOANS

Brokers' loans in New York City during the week ended Oct. 15 declined \$153,000,000, after a decline of \$158,000,000 the week before and a decline of \$159,000,000 two weeks before. The total on Oct. 15 amounted to \$2,752,000,000, as against \$6,801,000,000 a year ago.

FEDERAL RESERVE

The consolidated statement of the Federal Reserve banks for the week ended Oct. 15 showed increases of \$37,000,000 in holdings of discounted bills and of \$1,000,000 in holdings of Government Securities. Holdings of bills bought in the open market declined \$26,000,000. The reserve ratio on Oct. 18 was 80.9 per cent, as against 81.6 per cent both a week and two weeks earlier.

Herbert H. Dow Dies

DETROIT, Oct. 16—Dr. Herbert H. Dow, president of Dow Chemical Co., Midland, Mich., maker of light alloy duralumin for airplanes, etc., died Oct. 15 at the Mayo Clinic at Rochester, Minn., where he had been undergoing treatment for six weeks.

Collins to Distribute Reos in Chicago Area

DETROIT, Oct. 21—Announcement has been made by the Reo Motor Car Co. of appointment of R. H. Collins as Reo distributor for the Chicago area. Mr. Collins, who is opening his headquarters at 2220 S. Michigan Ave., was president of the Cadillac Motor Car Co. and general sales manager of Buick. His most recent connections were as distributor for Cadillac-LaSalle and for Chrysler.

Invent Electric Brake For Trucks and Trailers

LANSING, Oct. 21—Andrew C. Williams and Harvey E. and Ira B. McLean have invented an electrically operated brake specially suitable for use on truck and trailer combinations, which they plan to manufacture in this city.

In operation, the driver merely presses a button to set the brakes on the truck and the trailer simultaneously, and the brakes remain on until released by depressing the button anew.

Current for operation of the brakes is drawn from the regular storage battery of the truck and is consumed only while the brake is being applied or released. Demonstrations of the new brake were made in the streets of Lansing recently.

Airlines Ask to Operate

WASHINGTON, Oct. 22—Fifty scheduled interstate passenger air transport lines are now being operated under Letters of Authority issued by the Aeronautics Branch of the Department of Commerce, pending action on their application for Certificates of Authority.

A total of 60 applications have been received since the regulations requiring that application for Certificates of Authority be made, became effective Aug. 15.

Named Cirrus Receiver

DETROIT, Oct. 21—Detroit & Security Trust Co. has been appointed receiver for the American Cirrus Engines, Inc., by Federal Judge Charles C. Simmons. No adjudication on the petition in involuntary bankruptcy for American Cirrus has been made as yet.

Steel Market is Dull As Mills Await Action

NEW YORK, Oct. 23—Neither volume of demand nor prices in the steel market underwent any noteworthy change this week. Producers are reconciled to prevailing conditions over the remainder of the year, their interest centering chiefly in how soon and to what extent first quarter 1930 demand will make itself felt.

The more optimistically inclined hold to the belief that the beginning of the turn in the tide will make itself felt during the second half of December, while others say they will not be disappointed if real expansion of backlogs does not get under way before February.

Never before have the statistics of the automotive industries come in for such close attention in the steel market as at this time. Not so very long ago, the steel industry looked upon these indices as having little bearing on its own welfare, but today the slightest rise in motor car sales is looked upon in the steel market as a highly constructive factor.

Prices hold fairly steady all along the line, largely so because with the reduced volume of demand the per ton cost of all steel products has risen considerably and producers are becoming more and more painfully aware of this fact.

Pig Iron—The market rules easy with automotive foundries calling chiefly for carload lots.

Aluminum—The market has not been affected by announcement that the European Aluminum Cartel has reduced its official quotation to the equivalent of a little over 18 cents. The 4 cents per pound duty would bring the price of the imported metal to a figure where competition with the domestic product would hardly be profitable.

Copper—The market has turned quiet. An encouraging feature of the situation is that the Connecticut Valley copper and brass fabricating mills are working at a better rate than most other industries, an indication that 10-cent copper is bringing out some business from ultimate consumers.

Tin—A New York banking house has issued a report characterizing the curtailment program of the Tin Producers' Association as having proved highly effective, the world supply having been cut from 35,000 to less than 27,000 tons with current output reduced by 17 per cent.

Lead—Quite a few consumers bought lead for October and November shipment on the 5.10 cents, New York basis. The market has turned firm.

Zinc—The market was firmer at the beginning of the week, with spot metal held at 4 cents, East St. Louis.

Clime Heads Boosters

PHILADELPHIA, Oct. 17—H. R. "Bud" Clime, Perfect Circle, was elected president of the Automotive Boosters Club No. 18 at a meeting held here this evening.

E. Shapiro, Shapiro Sales Co., was elected vice-president and M. Scheinfeld, Berger Mfg. Co., and A. Perez, Burton & Rogers Mfg. Co., were re-elected secretary and treasurer.

Elected to the board of directors were: O. W. Cadle, Bonney Forge & Tool Works; L. F. Banigan, Motor World Wholesale; Harry Walters, Walters Mfg. Co., and J. K. Courim, Black & Decker Mfg. Co.

Men of the Industry and What They Are Doing

Heads Radio Sales

George Kohlenberger, formerly of the Oakland, Calif., branch of United



Motors Service, has been appointed manager of radio sales and service, according to an announcement by W. N. Potter, director of sales.

Mr. Kohlenberger has served as dealer, service director and in the experimental field of radio. He was one of the first men to direct the flight of an aeroplane from the ground by radio.

Campbell Ewald Co.

Andrew J. Eldred has joined the staff of Campbell Ewald Co. as account manager for the Oakland Motor Car Co. Mr. Eldred, until recently, was advertising manager of the Hudson Motor Car Co.

Scott is Promoted

W. N. Potter, director of sales of United Motors Service, Inc., has announced the appointment of E. N. Scott as manager of electrical sales in charge of sales of Delco-Remy and North East starting, lighting and ignition equipment, Klaxon horns and Guide Lamps.

Ledwinka Returns

Joseph Ledwinka, chief engineer for the Edward G. Budd Mfg. Co., has returned from a visit to England, where he cooperated with the British affiliated company, the Pressed Steel Co. of Great Britain, in introducing three new models of bodies for British manufacturers.

Joseph Meadowcroft, assistant works manager of the plant at Philadelphia, recently went to Paris after a brief visit to the home office, to continue work he has been doing there for the past six months in assisting the Andre Citroen Co. in its construction of steel bodies.

Promoted by Curtiss-Wright

C. S. "Casey" Jones has been promoted from president of the Curtiss-Wright Flying Service to vice-president of the Curtiss-Wright Corp., in charge of all public relations.

Major E. H. Brainard, formerly vice-president and general manager of the Curtiss-Wright Flying Service, becomes president.

Brown is President of Pratt & Whitney

Don L. Brown, vice-president of the Pratt & Whitney Aircraft Co., was elected president of the company by the board today, succeeding Frederick B. Rentschler, who is also president of the Chance Vought Corp. and of the United Aircraft & Transport Corp. Mr. Rentschler will become chairman.

George J. Mead, vice-president in charge of engineering, has been made head of a newly organized experimental and research division of the United Aircraft & Transport Corp., holding company for both Pratt & Whitney Aircraft and Chance Vought, and will also be chairman of the executive committee of the engine manufacturing company.

Charles W. Deeds, secretary and treasurer of both United Aircraft and Pratt & Whitney Aircraft, was elected vice-president of the engine company. He will retain his office as secretary of the local company, as well as both offices in the holding company.

J. F. McCarthy, comptroller for United Aircraft, was elected treasurer of Pratt & Whitney to fill Mr. Deeds' place.

Flynn Resigns

Gregory Flynn, sales manager of Moto Meter Gauge & Equipment Corp., has resigned.

McAdam is Promoted

Dr. D. J. McAdam, Jr., has been appointed as chief of the section on Metallography in the Division of Metallurgy, Bureau of Standards. From 1913 to Sept. 30, Dr. McAdam held the position of metallurgist at the naval engineering experiment station, Annapolis, Md.

He is well-known in metallurgical circles, and has done important "pioneer" work on the effect of corrosion on the endurance properties or "fatigue" of metals.

The far-reaching fundamental importance of this work was recognized by the American Society for Testing Material when, in 1927, the award of the first Dudley medal was made to him by this society.

Ricker Joins Pitcairn

R. W. T. Ricker, formerly of the McLain-Simpers organization, has joined the staff of the Pitcairn-Cierva Autogiro Co. of America.

Sears Resigns as Elcar Head

F. B. Sears resigned as president of Elcar Motor Co.

Promoted by General Spring

John B. O'Neill has been appointed assistant sales manager of the General Spring Bumper Corp. division of Houdaille - Hershey Corp. with headquarters in Detroit. For the past year he has been engaged in special sales activity for Houdaille - Hershey and its various subsidiaries.



Fords Arrive from Abroad

Mr. and Mrs. Henry Ford arrived in New York Wednesday from Europe.

Macourek Retires from Business

F. S. Macourek, secretary and treasurer of the Vlcek Tool Co., Cleveland, has resigned and retired from active business.

Tracy Honored by Associates

Stanley M. Tracy, treasurer of Driver-Harris Co., Harrison, N. J., was tendered a dinner recently by his associates in celebration of his 20 years' service with the company.

Lamson & Sessions Elects

C. H. Longfield has been elected vice-president of Lamson & Sessions Co., Cleveland, and H. H. Winterberg has been elected secretary. H. P. Ladds was appointed manager of sales.

Whittaker Resigns

J. H. Whittaker, vice-president and general manager of the Hudson Motor Car Co., has resigned, according to advices from Hudson.

Hambly at Olympia

Following his return from South America, Frank L. Hambly, export manager of the Marmon Motor Car Co., has left for Europe, where he will attend the Olympia automobile show in London and visit Marmon distributors on the continent.

Stephens Reo Distributor

Announcement has been made by Oakland Motor Car Co. of the appointment of H. M. Stephens as sales manager in charge of the western division. Until recently he was sales manager of the Cadillac Motor Car Co.

British Tax Denounced by Ford In Statement of Price Reduction

By M. W. Bourdon

LONDON, Oct. 20 (Special)—Henry Ford, in his visit to England, made an announcement of lower prices for Ford cars sold in this country. In a lengthy speech to publication representatives he said, "You are not getting the best out of the Ford car in England because of the horsepower tax. We have arranged, therefore, that in future the Ford car with the small (15 hp.) engine shall be higher priced than the standard chassis with its 24 hp. engine."

The penalty that English buyers will have to pay if they demand the 15 hp. engine amounts to £5, for that is the extra cost over and above the 24 hp. cars in all cases. Prices of the latter (apart from the phaeton which is £5 more at £185) are down by amounts ranging from £15 to £30, as follows:

Model	Old Price £	New Price £
Phaeton	180	185
Tudor Sedan	195	180
Standard Coupe	215	185
Fordor Sedan	225	210
De Luxe Fordor Sedan	245	225
Cabriolet	225	210

Reductions in truck prices range from £6 to £18.

Mr. Ford stated that the work of constructing the new plant at Dagenham (near London) was progressing, according to schedule. It would not be in production, however, for another twelve months. The work already done or covered by contracts involved expenditure of £2,621,582. The production capacity of the plant would be 1000 vehicles per eight-hour day, and at Cork 200 tractors a day would be produced.

It was expected that at least three-fourths of the output at Dagenham would be exported to markets outside Great Britain. In terms of money

values, this was at least £15,000,000 sterling—exports into markets which, for the most part, were already created and taking their requirements from the United States.

Britain seemed to have no export trade, Mr. Ford added, except for commercial and high-priced or midget cars, and presumably never would have, so long as the system of taxation compelled British manufacturers to design inefficient machines. The new Model "A" Ford car had met with astonishing success in every part of the world. In England, however, they had been compelled to modify the horsepower of the engine because of the heavy taxation. The British public were using automobiles of less efficiency and comfort than any other country. In the British Colonies, where there was a preferential tariff in favor of British motor cars, the British did not sell one-tenth of the vehicles imported by those Colonies, for the reason that British-made cars were underpowered because of the horsepower tax.

It is worthy of note, in view of the foregoing, that Sir Percival Perry, chairman of the Ford Motor Co. of England, has addressed a memorandum to the British Government advocating a change in the basis of car taxation from the present £1 per rated horsepower to a tax of 5 per cent on the retail price of complete vehicles.

He gives examples of how his proposal would work out in connection with certain British cars, but it becomes evident that buyers of the 24 hp. Ford would gain more advantage from an ad valorem tax basis than those of British makes in general. Thus the 24 hp. Ford Tudor sedan, now taxed £24 per annum, would escape with a tax of £9.

New Republic Four-Ton Replaces Old Models

Six-Cylinder Lycoming Engine Develops 88 Hp.

ALMA, MICH., Oct. 21—La France Republic Corp. has announced a new Model H-2, of 15,000 lb. straight rating (3½-4 tons pay load), which replaces its former Models H-1 and L-1.

It carries a six-cylinder 3½ by 5-in. Lycoming engine of 88 hp. rating. Engine power is transmitted to the rear axle through a Fuller transmission flanged to the engine.

Two five-speed units are available at extra cost, one of these having the feature of an exceptionally high reduction ratio for the first speed, and the other that of an overdrive, which is of value to the truck owner where a return journey must be made without load, as it permits of considerable road speeds being made without racing the engine.

What is referred to as a "floating type" of rear spring is employed, the spring brackets resting freely on the main leaves of the springs and all driving thrust being taken by radius rods. Other features of the Model H-2 are a Timken bevel-gear driven, full-floating rear axle and Lockheed hydraulic internal four-wheel brakes.

Standard tire equipment is 34 x 7 heavy-duty pneumatic tires with dual rear, or 8.25-20 balloons, at the option of the purchaser. Other tire equipment is available to meet the individual needs of the customer.

Comfort of the driver has been cared for in the roomy, three-point suspension cab with a comfortable seat and backrest, and in the convenient arrangement of the operating controls and the instrument board.

Attractive appearance is another object aimed at by the designers of the Model H-2. The chromium-plated steel radiator shell is high and narrow, and similar lines are followed in the design of the hood, cowl and cab.

Financial Notes

Waukesha Motor Co. for the year ended July 31, 1930, reports net profit of \$450,579 after charges and Federal taxes, equivalent to \$4.50 a share and compares with \$1,801,952, or \$18.02 a share, in the preceding fiscal year.

Paramount Cab Mfg. Corp. and subsidiaries report net loss for the year ended Sept. 30 of \$280,912 after all charges. This compares with profit of \$1,115,981, or \$4.46 a share on common stock then outstanding.

National Carbon Co. declared regular quarterly dividend of \$2 on preferred payable Nov. 1 to holders of record Oct. 20.

Bower Roller Bearing Co. has declared regular quarterly dividend of 25 cents payable Dec. 1 to holders of record Nov. 14.

Electric Auto-Lite Co. announced that preliminary figures on operations during the third quarter confirmed previous estimates that earnings for the quarter were sufficient to show the dividend requirements of \$4.50 for the first nine months were completely earned after all charges. The full year's cash dividend requirement of \$3 a share on the capital stock of the Noblitt-Sparks Industries was covered by a substantial margin in the nine months ended Sept. 30. Earnings statement showed a net of \$402,721 or \$5.14 a share on the 78,326 shares outstanding, compared with \$489,673, or \$6.25 a share on the same capitalization in the same period of 1929. Profits in September

amounted to \$109,363, equal to \$1.39 a share as compared with \$153,459 or \$1.95 a share in September, 1929. In addition to the cash dividend of \$3 a share annually, the issue pays a 6 per cent stock dividend.

Motor Products Corp. reported net profit for quarter ended Sept. 30 of \$15,054 after charges and Federal taxes equal to 8 cents a share earned on 197,366 no par shares of capital stock.

This compares with net profit of \$370,220, or \$1.87 a share in preceding quarter, and \$470,586, or \$2.33 a share on same number of shares in third quarter of 1929.

Net profit for first nine months this year was \$617,293 after charges and taxes equal to \$3.13 a share, which compares with \$2,200,017 for corresponding period last year, equal to \$10.85 a share on common after preferred dividends for 4½ months to May 18, when preferred stock was retired.

Johns-Manville reports net profit for the nine months ended Sept. 30 of \$2,943,027, or \$3.40 a share, on common stock after preferred dividends, and compares with earnings of \$5,533,397, or \$6.84 a share, in the corresponding period of last year.

Edward G. Budd Mfg. Co. has declared regular quarterly dividend of 1½ per cent on the 7 per cent preferred stock payable Nov. 1 to holders of record Oct. 27.

Black Continues in Favor in Automobilies

NEW YORK, Oct. 20—Black continues to hold first place among the fall colors for automobiles, according to the October issue of the Duco Automobile Color Index, with deep lively blues holding second place.

The order of preference established in last month's index has not been altered, although the advance of black has been accomplished largely at the relegation of brown.

Because of the interest already evidenced in deep, vivid, reddish and greyish hues of brown, it is not anticipated that the brown color group will fall below green in importance this fall.

Due to this season's mode for black, interest in clear, dark shades of colors slightly off black in many cases seems to have been aroused.

Exports, Imports and Reimports of the Automotive Industry for September and for Nine Months Ended September, 1930-1929

	Month of September		1929		Nine Months Ended September		1929	
	1930	1929	1930	1929	1930	1929	1930	1929
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories.....	..	\$16,421,262	..	\$33,401,143	..	\$233,511,346	..	\$455,382,705
Electric trucks and passenger cars.....	..	..	15	24,344	30	54,247	125	187,039
Motor trucks and buses except electric (total)	5,312	3,447,121	12,985	7,409,732	69,722	46,602,789	162,451	91,480,878
Up to one ton inclusive.....	1,990	962,474	10,056	4,378,474	27,243	14,544,345	124,953	54,228,946
Over 1 and up to 2½ tons.....	3,055	1,868,491	2,710	2,493,205	38,931	24,844,924	34,863	30,430,797
Over 2½ tons.....	267	616,156	219	533,053	3,498	7,213,520	2,635	6,821,135
PASSENGER CARS.								
Passenger cars except electric (total).....	8,125	5,590,188	20,934	14,394,282	130,793	91,267,423	291,752	199,115,314
Low price range \$1,000 inclusive.....	5,942	2,886,775	15,227	7,624,990	94,786	47,864,384	222,659	113,822,616
Medium price range \$1,000 up to \$2,000.....	1,863	1,921,887	4,971	5,150,687	31,541	32,708,229	60,906	65,808,074
High price range over \$2,000.....	320	781,526	736	1,618,605	4,466	10,694,810	8,157	19,484,624
PARTS, ETC.								
Parts, except engines and tires.....	..	..	..	..	..	..	..	..
Automobile unit assemblies.....	..	3,893,378	..	5,992,980	..	51,149,783	..	93,612,664
Automobile parts for replacement (n.e.s.).....	..	2,967,799	..	4,249,653	..	33,999,790	..	53,193,057
Automobile accessories.....	..	369,021	..	645,845	..	4,493,299	..	7,695,571
Automobile service appliances (n.e.s.).....	..	384,774	..	508,443	..	5,089,106	..	5,788,299
Trailers.....	68	26,178	66	44,150	1,155	531,774	763	362,831
Airplanes, seaplanes and other aircraft.....	14	187,219	30	388,307	251	3,740,082	270	4,353,436
Parts of airplanes, except engines and tires..	..	208,768	..	151,227	..	1,753,698	..	1,626,515
BICYCLES, ETC.								
Bicycles.....	328	8,765	467	13,524	3,152	84,582	4,072	107,996
Motorcycles.....	355	86,450	1,447	320,671	9,295	2,166,047	13,532	3,049,858
Parts and accessories, except tires.....	..	52,856	..	93,729	..	811,271	..	868,305
INTERNAL COMBUSTION ENGINES								
Stationary and Portable								
Diesel and Semi-Diesel.....	25	66,518	27	95,066	236	738,521	625	907,719
Other stationary and portable:								
Not over 10 hp.....	2,513	161,035	2,680	205,668	21,314	1,559,533	28,073	2,443,935
Over 10 hp.....	80	64,613	406	207,296	3,899	2,148,222	3,616	1,801,854
Automobile engines for:								
Motor trucks and buses.....	18	8,168	340	56,278	19,065	1,574,463	7,750	1,066,181
Passenger cars.....	1,555	151,437	5,375	569,581	38,657	3,749,493	80,842	8,394,727
Tractors.....	4	1,273	152	59,179	256	101,447	753	244,190
Aircraft.....	41	172,416	28	97,637	294	1,289,343	265	1,127,090
Accessories and parts (carburetors).....	..	260,814	..	273,690	..	2,770,183	..	3,377,271
IMPORTS								
Automobiles and chassis (dutiable).....	88	104,267	92	78,842	462	684,288	525	913,455
Other vehicles and parts for them (dutiable)	..	13,912	..	97,964	..	434,503	..	1,550,405
REIMPORTS								
Automobiles (free from duty).....	41	38,021	54	86,380	240	231,819	364	457,399

McAneeny Resumes Hudson Managership

DETROIT, Oct. 25—William J. McAneeny, president of Hudson Motor Car Co., resumed the general managership of that corporation in addition to his presidential duties, Oct. 19. In assuming control of both offices, Mr. McAneeny is occupying the same capacities to which he was appointed in April, 1929.

Railroads Need Pay No Gas Tax in Oklahoma

OKLAHOMA CITY, OKLA., Oct. 22—A ruling that gasoline sold to railroad companies for use in gasoline motors used in interstate commerce is not subject to the state gasoline tax of four cents on the gallon, has been issued by J. Berry King, attorney general.

King based his opinion on a ruling of the Federal courts that gasoline used in interstate aircraft is not subject to the tax.

In the same opinion, the attorney general asserted that there was no law authorizing the auditor to refund gasoline tax alleged to have been illegally collected.

Du Pont Report \$1.05 Net

NEW YORK, Oct. 23—E. I. du Pont de Nemours & Co. report net income for the quarter ended Sept. 30 of \$13,033,345, or \$1.05 a share, on outstanding common stock, as compared with \$20,029,831, or \$1.80 a share, on stock outstanding for the corresponding quarter last year.

This figure includes \$7,487,465 in-

come from investment in General Motors Corp. for the third quarter this year, as compared with \$10,505,322 for the same period last year.

Pierce-Arrow on \$2 Basis

BUFFALO, Oct. 22—Class A stock of the Pierce-Arrow Motor Car Co. yesterday was placed on a \$2 annual dividend basis by directors of the company at a meeting in this city. An initial quarterly dividend of 50 cents per share on the Class A and the regular quarterly dividend of \$1.50 per share on the 6 per cent preferred were voted, both payable Dec. 1, to stock of record Nov. 10. The greater part of the dividend on the Class A stock will go to the Studebaker Corp., which early this year owned 128,014 of the 197,250 shares of this class outstanding.

Texas Collects \$32,000,000

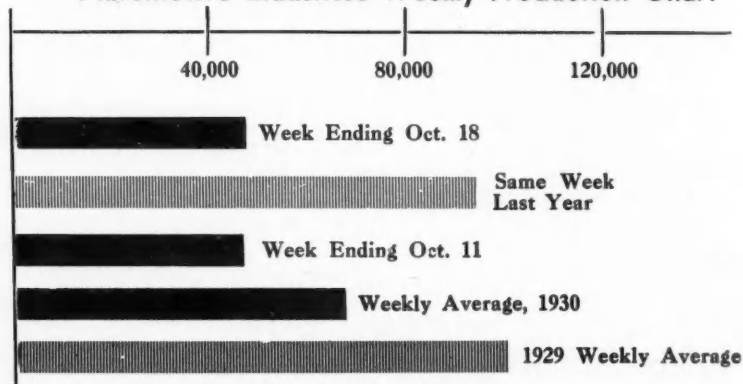
AUSTIN, TEX., Oct. 22—During the fiscal year ending Aug. 31, 1930, the four-cents-a-gallon gasoline sales tax brought to the state a total revenue of \$32,221,529.78, according to the annual report of State Comptroller George H. Sheppard.

Refunds were made to farmers for fuel used in tractors and to other claimants under the law amounting to \$2,292,535.56, leaving a balance of \$29,928,994.22, of which \$22,446,745.67 went to the state highway fund.

Have New Sales Set-Up

DAYTON, Oct. 20—Frigidaire Corp. and General Motors Radio Corp. have formed an alliance making it possible in many instances for the General Motors radio and electric refrigerator to be sold by the same dealer.

Automotive Industries Weekly Production Chart



Isherwood Cites Necessity of Trade Journals and Conventions as Guides

DETROIT, Oct. 25—Trade journals we read and trade conventions attended are a matter of real necessity, W. S. Isherwood, sales manager of AC Spark Plug Co., declared in a talk before AC district sales managers who met in Flint prior to departure for the M.E.A.-N.S.P.A. show and convention in Cleveland.

"Trade journals show how others have met and overcome business problems. In every issue there are helpful ideas that can be applied to one's business.

"One may profit from instructive editorials or from a seemingly insignificant item of a few lines which touches on a subject in which the reader happens to be very much interested. Often a different thought is got from an article, and that thought may prove to be one needed and perhaps long sought in solving a business problem.

"Thoughtful reading of automotive trade journals develops keener interest in solving our problems; provides ideas from which new vistas of thought arise, and opens more avenues of opportunity."

Touching upon the advantages of shows and conventions, Mr. Isherwood said in part:

"Some men think that attending conventions and trade shows is a waste of time; that there is nothing to them except a lot of mediocre speeches,

routine papers and merchandise that they already know about.

"But actually those who attend conventions and trade shows can benefit in many ways. By application they can gain in knowledge, mental keenness and breadth of vision, thereby better fitting them for their business.

"Conventions and trade shows provide for the important opportunity of personal contacts, for unrestrained, informal interchange of ideas between men of similar interests but of widely dissimilar experiences.

"An informal chat during a convention may bring from some well-informed acquaintance a suggestion that clears the way for solving a troublesome and complex problem that one has been confronted with for months.

"Convention chats breed inspirations, quicken the ambition, and important indeed are the benefits that may come to those that are observing.

"Trade shows provide an opportunity to at first hand meet the manufacturer executives, discuss policies, build new friendships, compare companies, their policies, merchandise, etc.

"A well-scheduled and carried-out program of contacts for various purposes should and will bring a wealth of ideas and information that later can be put to good use—both from a buying, selling and management angle."

Peru Orders Coloration of Gasoline to Block Fraud

WASHINGTON, Oct. 20—The Peruvian Military Government has issued a decree compelling coloring of kerosene and tractoline (kerosene for tractors), blue and amber respectively, in order to prevent their use to adulterate gasoline dispensed from filling stations, according to a dispatch received in the Department of Commerce.

Crude Rubber Continues Low

NEW YORK, Oct. 20—Crude rubber prices continue low with the future decidedly uncertain, due to a continuing increase in supplies available, according to F. R. Henderson, president of the Rubber Exchange of New York.

At present price levels it is believed that native production, the most uncertain element in the producing area, will be markedly reduced due to the inability of natives to employ help in gathering rubber. Certain of the plantations are also reducing operations, but most of these will continue a certain volume of production in order to offset as much as possible the continued cost of overhead,

A recent survey of the financial position of 47 Dutch producing companies indicates that should prevailing conditions continue for a further period of 12 months, approximately one-third of them will find their cash resources exhausted. Recent surveys of costs indicate that 15 to 16 cents a pound in New York is a fair representative cost, and Mr. Henderson believes that the market will respond to this cost.

5-Cylinder Engine Approved

NEW YORK, Oct. 20—Kinner Airplane & Motor Corp. has just been granted a Department of Commerce approved type certificate No. 62 for its five-cylinder radial engine which is rated by the department at 210 hp. at 1900 r.p.m. This engine weighs 420 lb., according to Robert Porter, president of the company.

World Aero Show Dec. 10

PARIS, Oct. 20—More than 40 nations will show their aeronautical products during the International Air Safety Conference to be held here from Dec. 10 to 23.

DO-X to Attempt Atlantic Crossing

Dornier 12-Motor Craft Plans Takeoff Next Week

FRIEDRICHSHAFEN, Oct. 17—Weather permitting, the DO-X, the world's largest flying boat, will start next week on the flight which is to take her to New York.

This craft was described in *Automotive Industries*, Aug. 3, 1929.

The 12-motor seaplane has been approved by the German Air Ministry after a series of official tests and is now being tuned up for her preliminary hops to Amsterdam, Southampton, Havre, Vigo and Lisbon.

It is planned to take off from Lisbon on Nov. 3 for the Azores and thence to proceed to New York via Bermuda. A tank ship will be stationed between the Azores and Bermuda, where the DO-X will refuel.

The DO-X will be in charge of Captain Friedrich Christensen, with Lieutenant C. H. Schildhauer, former American naval officer, and Flight Captain Horst Merz as navigating officers. Harvey Brewton will be the chief engineer. The DO-X will carry a complete life-saving equipment consisting of rubber rafts and collapsible rubber boats.

Pioneer Prices Cut 20%

NEW YORK, Oct. 20—Pioneer Instrument Co., a division of Bendix Aviation Corp., has reduced prices on aeronautical instruments and equipment an average of 20 per cent, according to announcement made by Charles H. Colvin, president.

These reductions are made possible through installation of new plant equipment, reorganization of manufacturing methods and coordination of its activities with those of the Aircraft Control Corp., recently acquired by Bendix from the Consolidated Instrument Co. of America.

C. I. T. Secures Listing

NEW YORK, Oct. 22—Commercial Investment Trust Corp. has secured permission from the New York Stock Exchange to continue listing of stock purchase warrants, originally listed for expiration Dec. 31, 1930. These warrants were issued in connection with 6½ per cent first preferred stock, issued on Jan. 1, 1928, and entitle holders to purchase common stock.

Consumes 36 Gal. Per Hour

PHILADELPHIA, Oct. 23—In the description of the new Stinson Airliner in our issue of Sept. 13, the fuel consumption of the liner was given as 11 gal. per hr. We are now informed by the Stinson Aircraft Corp. that this figure was erroneous, and that the actual consumption at cruising speed is 36 gal. per hr.

Canadian Motor Exports Gaining

Report Shows 9% Gain Over July

WASHINGTON, Oct. 20—Canadian passenger cars and trucks valued at \$1,618,517 were exported in August, 1930, an increase of nine per cent over July shipments which totaled \$1,480,928, although 51 per cent below the August, 1929, valuation of \$3,326,789, according to the Automotive Division, Department of Commerce.

Exports of passenger car units were three per cent above July, 1930, shipments although their value was 6 per cent less. Truck exports increased 30 per cent in number and 38 per cent in value, as compared with the preceding month. Slight increases were registered in exports of passenger cars in all price classifications, but larger gains were shown in the exports of trucks, 13 per cent in the classification one ton or less capacity and 41 per cent over one ton capacity. Exports of trucks in the classification over one ton capacity exceeded those in August, 1929, by 5 per cent.

Production of motor vehicles in Canada during August, at 9792 units, showed little change from the 10,188 made in the preceding July, but was 31 per cent less than the output of 14,214 units in August, 1929. The monthly index figure of the Dominion Bureau of Statistics moved from the minimum for the year of 48.2 per cent below normal in July to a slightly higher level in August when it registered 46.8 per cent below normal.

Closed model passenger cars dropped to 4766 from 6332 units, and trucks declined to 307 from 394, while open passenger cars advanced to 1663 from 1609, and the number of chassis rose to 3036 from 1833.

The average unit value of passenger cars and trucks exported in August was respectively \$429 and \$381, as compared with \$446 and \$359 in July, 1929.

When compared with the previous month, shipments of passenger cars to the two leading markets, New Zealand and Australia, showed increases of 18 and 39 per cent respectively. New Zealand's takings of low-priced passenger cars, value up to \$500, increased from 387 to 458 units and medium-priced units from 265 to 307.

Australia, which ranked first as a market for Canadian low-priced passenger cars "500 or less," increased its takings in this classification from 398 to 554 units. British South Africa and British India were the next largest purchasers of low-priced cars, taking 207 and 208 units respectively, as compared with 287 and 155 in the preceding month. Exports to British India, British East Africa, Straits Settlements, Newfoundland, Egypt and Siam registered increases or compared favorably with the shipments in August a year ago.

Hanch Shows How Finance Companies Keep Public's Money in Circulation

CHICAGO, Oct. 22—How finance companies put dollars in circulation, instead of holding down purchasing power by keeping instalment payments hanging over the heads of the buying public, was outlined by C. C. Hanch, general manager of the National Association of Finance Companies.

The annual volume of business done by 139 finance companies last year, amounting to \$2,880,994,322, was practically nine times their capital, Mr. Hanch said.

"The possibility of the volume of business being so much larger than the capital resulted in part from the circumstance that much of the money used was borrowed from banks, and in part from the fact that every dollar available was used more than twice.

"On twelve months instalment paper, payments come in at a rate which allows each dollar to be used twice in a year, while the turnover is much more rapid on shorter time paper. The average net profit of the 139 finance companies last year was 1.23 per cent of the volume of business done, which certainly does not justify their classification as profiteering concerns.

"This continual turnover of finance company dollars also refutes the arguments of many people today that an enormous hangover of last year's instalment buying is holding down the purchasing power of the public at this time. Sixty per cent of the retail automobile paper handled by these finance companies last year had been liquidated at the end of December.

"The outstanding instalment obligations are considerably less now than they were twelve months ago, so that organizations which facilitate instalment buying cannot justly be blamed for the present slow purchasing inclinations of the people.

"We estimate that only about 11 per cent of the 1929 instalment debt on automobiles is outstanding today, while the new debt contract this year is from 15 to 20 per cent smaller than last year's obligation. The slow-to-buy public is burdened with less instalment debt now than it has had for years. Theorists must find some other reason than instalment buying to explain the public attitude of closed pocketbooks, if they read rightly the statistics of those organizations which have most to do with time sales."

Goodyear 6-Hour Day Schedule Fits Low Demand

AKRON, Oct. 22—Adoption of the six-hour day for workers in the Goodyear Tire & Rubber Co. plants is a temporary measure designed to meet the conditions arising from present economic conditions and the slow seasonal requirements always evident in the industry at this time.

Goodyear is operating in its Akron plant four days a week, 24 hours a day, the daily schedule being divided into four six-hour shifts instead of three eight-hour shifts as previously used.

The B. F. Goodrich Co. does not anticipate any further reduction in working schedules between now and the first of the year, according to James D. Tew, president of the company.

Quebec Gas Sales Increase

QUEBEC, Oct. 20—Gasoline sales in Quebec during the 12 months ended July 1, 1930, amounted to 81,000,000 imperial gallons, compared with 66,000,000 gal. during the preceding 12 months' period, according to official Canadian statistics forwarded to the U. S. Department of Commerce.

Pierce-Arrow Exports Gain

BUFFALO, Oct. 22—Pierce-Arrow's overseas shipments this year continue to show an increase over those of last year. Export shipments up to Oct. 1, excluding Canada, are 7 per cent above shipments made during the first nine months of 1929.

M.E.A. Announces Membership Increase

NEW YORK, Oct. 20—The Motor and Equipment Association has recently admitted to membership the following companies: Bear Mfg. Co., Rock Island, Ill.; Brookins Mfg. Co., Dayton, Ohio; Carlile & Doughty, Philadelphia, Pa.; Gray Co., Inc., Minneapolis, Minn.; Indian Refining Co., Lawrenceville, Ill.; Monark Battery Co., Chicago, Ill.; Waverly Oil Works, Pittsburgh, Pa., and the Terre Haute Heavy Hardware Co., Terre Haute, Ind.

The board of directors has also approved the transfer of the Titeflex Metal Hose Co., Newark, N. J.; Sterling Cable & Carbon Co., Cleveland, Ohio, and Schwarze Electric Co., Adrian, Mich., from Division A to Division B membership.

Division B includes those manufacturers who market their products to the replacement through wholesalers. Members of Division B are entitled to exhibit in the joint show in Cleveland, Nov. 13 to 19, and all the new manufacturing members admitted are planning to exhibit at this show.

Wright-Tuttle Reorganizes

CHICAGO, Oct. 20—The Wright-Tuttle Aircraft Co., of Anderson, Ind., has been reorganized and reincorporated under Indiana law as the Powercraft Motors Co. According to Victor Wright, president, they are negotiating with a Red Banks, N. J., company for the right to make an established outboard motor for boats.

N.S.P.A. Ethics Code is Sent to Export Houses by Trade Body

DETROIT, Oct. 20—A code of ethics establishing a standard of export practices is being submitted to all export houses and combination export managers on the accredited list of the National Standard Parts Association by the N.S.P.A. International Trade Committee. Those individuals and firms signifying their approval of the code and willingness to adhere to it will continue to be carried on the accredited list of the committee.

At the present time comprised of about 40 names, this list is recognized by N.S.P.A. manufacturers as the blue book of overseas representatives. While the names included are never revealed by the committee, each accredited representative has been so

advised and knows that remaining on this list and retaining N.S.P.A. manufacturers' accounts is dependent upon playing according to the rules.

The code, prepared by men of long experience in the export business, covers such points as piracy, patents, guarantees, contract terms, bootlegging, padding, substitution, misrepresentation and false claims.

Members of the N.S.P.A. International Trade Committee are C. M. Peters, chairman, Black & Decker Mfg. Co.; D. McIntosh, American Steel Export Co.; George Tiffany, Kellogg Mfg. Co.; Edward L. Caswell, Thompson Products, Inc., and George E. Quisenberry, Counsel, Business Publishers' International Corp.

Adapts Compass for Marine Use

NEW YORK, Oct. 22—Pioneer Instrument Co. has adapted its airplane aperiodic compass for marine use. The instrument, which is essentially the same as that used in aircraft with the exception of the mounting, is called the Pioneer Straightway compass. This compass resumes a correct reading with almost no overshooting or oscillation after the sharpest turn.

Tennessee Registrations Up

NASHVILLE, Oct. 20—License plates for 314,701 Tennessee automobiles were issued by the Tennessee state department of finance and taxation from Jan. 1 to Aug. 30. For the same period 1929, 312,682 plates were issued. The department issued plates for 35,051 trucks, as compared with 30,216 for same period 1929.

Motorcycle registrations increased from 1081 in 1929 to 1214 in 1930.

A total of 357,958 licenses were issued for all classes of motor vehicles. The total for the same period in 1928 was 350,904. The collections of the motor vehicle department from Jan. 1 to Aug. 30, 1930, amounted to \$4,644,917.55, as compared to \$3,890,829.94 same period 1929. Average price of license plates for 1929 were \$11.09, and in 1930 \$12.98.

A decrease is shown in registration of new automobiles of 11,956, for the first eight months of 1930, as compared with same period 1929.

Crude Rubber Consumption

NEW YORK, Oct. 22—Consumption of crude rubber in the United States for the month of September is estimated by the Rubber Manufacturers Association at 25,288 long tons.

Imports during the month were 39,467 long tons.

Total domestic stocks on hand and

in transit overland as of Sept. 30 are placed at 169,607 long tons, with crude rubber afloat for United States ports estimated at 60,923 long tons.

Motor Bus Hearings In St. Louis Nov. 17

WASHINGTON, Oct. 23—The first of 17 hearings ordered by the Interstate Commerce Commission in connection with the relationship between interstate rail and motor bus lines will be held at St. Louis, Nov. 17. The hearings will be conducted by Commissioner Brainerd and two examiners. In announcing the hearings, which mark a continuation of a proceeding that has been under way for some time, the commission said that they "will be confined primarily to the matter of coordination between carriers subject to the transportation act and common carriers by motor."

The other hearings were announced as follows: Kansas City, Nov. 21; Dallas, Tex., Nov. 28; New Orleans, La., Dec. 3; Atlanta, Ga., Dec. 8; Detroit, Dec. 11; Boston, Dec. 15; New York, Dec. 18; Chicago, Jan. 5; St. Paul, Jan. 12; Seattle, Wash., Jan. 19; Portland, Ore., Jan. 22; San Francisco, Jan. 27; Los Angeles, Feb. 2; Denver, Feb. 9; Omaha, Feb. 14; Washington, March 4.

Container Jury Reports

PARIS, Oct. 21—The jury of the international freight-container competition which is being conducted under the auspices of the International Chamber of Commerce here has made a preliminary report and selected fourteen designs from among those submitted. Another meeting is to be held during the middle of January, next, at which time it is hoped to select the design for the international standard container for use on motor trucks and railway flat cars.

Hoffman Stresses Value of Merchandising Service

Studebaker Executive Sees Need of Maintenance Sales

PITTSBURGH, Oct. 21—New car sales in the future will become a minor departmental activity in a general service and accessory business, according to Paul G. Hoffman, vice-president of Studebaker Corp. of America. In a paper read before the American Management Association, discussing trends of motor car distribution, he wrote that "dealers, as a whole, have paid too little attention to continued contact with their customers."

"They have permitted outside agencies to take away lubrication, repair, battery and sundry other services which logically belonged to them."

"The loss of this business not only represents lost profits in the actual sales involved, but also lost contacts with the customers, which has an important bearing on their future business."

"I disagree with some observers on the subordination of new car selling to service and accessory merchandising. There won't be any of these 'by-product' profits unless there are new car sales."

"Success in retailing will, I believe, result from effective organization and aggressiveness along both lines of activity. I look for improvements, not revolution, in the marketing of motor vehicles."

Competition to Extend Tar Oil Use in Diesels

BERLIN, Oct. 20—A prize competition for new methods of utilizing tar oil in Diesel engines, and particularly in high-speed small engines, is being organized by the German Sales Combine for Tar Products. Prizes of 10,000, 5000 and 3000 marks are being offered. It is hoped to make the awards by Oct. 1, 1931.

Court Defines Motorcycle

LITTLE ROCK, ARK., Oct. 21—A motorcycle is not an automobile as classified in accident insurance companies, the Arkansas Supreme Court, has decided in denying judgment in the case of a man fatally injured while riding a motorcycle which collided with an automobile.

Leduc Sees Business Upturn

MONTREAL, Oct. 22—A better feeling is beginning to prevail among business men and it seems that business has started on the upturn, according to Florian Leduc, general sales manager of the Canadian Willys-Overland Sales Co., Ltd., Toronto, who was in Montreal last week on a tour of eastern Canada.

Bendix Reports Earnings Down

Dividends May Not Be Met, President Says

CHICAGO, Oct. 25—Earnings of Bendix Aviation Corp. for 1930 are not likely to cover dividend requirements, Vincent Bendix, president, has stated upon his return from Europe. He attributes this circumstance to heavy inventory writeoffs during the first six months and the process of general readjustment in business.

Earnings of the company, he said, will show a decline for the current year, but with effected economies throughout the organization, the company is now in an excellent position to benefit by improved conditions.

In the first six months of the year Bendix showed net profit of \$1,530,937, equal to 73 cents a share.

The aviation end of the Bendix operations, Mr. Bendix stated, is holding up well and running near the level of a year ago. Regarding the automotive brake business, he said the company recently acquired a large increase in General Motors business, and this, in addition to new contracts from other leading automobile companies, assures a satisfactory gain for the coming year.

Alternating Shows Discussed Abroad

PARIS, Oct. 10—At the meeting of the Bureau Permanent of Automobile Manufacturers Associations here on Oct. 4, the proposition to hold automobile shows in the same place in future only every two years, and of alternating shows in different countries, was to be discussed. However, as a result of a communication from the British Society of Motor Manufacturers and Traders, which does not wish a change in present methods, discussion of the subject was postponed to a later date. The Bureau Permanent hereafter will concern itself also with questions of transport coordination, of road construction and road traffic.

Acetylene Convention Nov. 12

CHICAGO, Oct. 20—The thirty-first Annual Convention of the International Acetylene Association will be held in the Congress Hotel, Nov. 12, 13 and 14. W. N. Dunlap of the Aluminum Company of America will present a paper on Truck Transportation.

Fokker Aircraft Declares

NEW YORK, Oct. 20—Fokker Aircraft Corp. of America has declared regular quarterly dividend of 43% cents on first preferred payable Oct. 15.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

National Roadbuilders' Show and Convention, St. Louis Jan. 10-16
International Garage Exposition, Berlin, Germany May 9-Aug. 9
New York, National Automobile... Jan. 3-10
Chicago, National Automobile... Jan. 24-31
Cleveland, Ohio, Automobile... Jan. 24-31
Buffalo, N. Y., Automobile... Jan. 10-17
Newark, N. J., Automobile... Jan. 10-17
Detroit, Mich., Automobile... Jan. 17-24
Syracuse, N. Y., Automobile... Jan. 26-31
San Francisco, Calif., Automobile, Feb. 1-8
St. Louis, Mo., Automobile... Feb. 2-7

CONVENTIONS

Regional Traffic and Aviation Conference (U. S. C. of C., Aeronautical C. of C., Chicago Asso. of Comm.), at Chicago Nov. 5-6
International Acetylene Association, Chicago Nov. 12-14
Motor and Equipment Association, Convention, Cleveland Nov. 13-19
N. S. P. A. Convention, Cleveland, Ohio, Nov. 13-19
Annual Asphalt Paving Conference, Memphis, Tenn. Dec. 1-5
First International Aerial Safety Congress, Paris, France Dec. 10-23
Society of Automotive Engineers, Annual Dinner, New York Jan. 8
Society of Automotive Engineers, Annual Meeting, Detroit... Jan. 19-23
Society for Steel Treating (National Western Metal and Machinery Exposition), San Francisco... Feb. 16-20

SALONS

Chicago, Drake Hotel Nov. 8-15
New York, Commodore Hotel, Nov. 30-Dec. 6
Paris, France, Salon (Commercial Vehicles) Nov. 13-23
Brussels, Belgium, Salon Dec. 6-17

Russian Crude Oil Gains

NEW YORK, Oct. 22—The National Industrial Conference Board has published the results of a survey recently made of the crude oil situation, taking particular cognizance of oil production in Russia. This report is entitled Oil Conservation and Fuel Oil Supply.

It is pointed out in this survey that from 1918 to 1921 Russia's production was at the rate of 29,000,000 bbls. a year. Since 1921 production has increased so that by 1929 it was approximately 103,000,000 bbls.

Kinner Amendments Approved

LOS ANGELES, Oct. 20—Amendments to the articles of incorporation of Kinner Airplane & Motor Corp., as drawn up by directors and submitted to stockholders in August, have been approved.

Pennsylvania Collects 12 Million

HARRISBURG, Oct. 22—Pennsylvania collected \$12,239,805 in gasoline taxes between June 1, the opening of the present fiscal year, and Oct. 1. More than \$9,000,000 of this was collected under the new 4-cent tax on each gallon.

Ford Salvages Over 30,000 Used Cars

Junking Line Averages 600 Units a Day

DETROIT, Oct. 20—More than 30,000 old automobiles have been salvaged by the Ford Motor Company since it began the salvage work as an experiment early this year. The salvage line is now averaging 600 cars and trucks a day from Detroit and vicinity.

Old cars are purchased from dealers who take them as part payment on new Fords. On the salvage line everything in them is reclaimed to serve some useful purpose.

Artificial leather is made into aprons, upholstery goes into hand pads, floor boards serve as crate tops, glass is used for window panes, and metal is utilized in the making of steel.

Cars of all makes find their way to the salvage line—a moving conveyor on which the cars ride slowly along, while workmen strip them of their various materials.

Some of them are Model T Fords, some are makes that have been out of production for years, and others are automobiles that in their day were driven by liveried chauffeurs.

Aero Chamber Studies Used Aeroplane Sales

NEW YORK, Oct. 20—The Aeronautical Chamber of Commerce of America, Inc., is conducting a study of used airplane sales with a view to formulating a standard method of arriving at prices for used planes. They are sending out questionnaires to distributors to learn from them the basis on which they evaluate used planes for sale.

In this questionnaire they are seeking data on specific sales covering the sale price, number of hours the plane has flown, number of hours the engine has flown, type of plane, engine and propeller, the equipment and the age of the plane.

The chamber hopes by compiling data resulting from this questionnaire to be able to set up a base for trading in used planes similar to the Automobile Blue Book.

Young Spring Requirements Met

CHICAGO, Oct. 14—L. A. Young Spring & Wire Corp. will report for the nine months ending Sept. 30 net earnings in excess of the full year's dividend requirements of \$3 a share. Profit for the quarter ended Sept. 30, totaled approximately \$210,375 after charges and taxes equal to 51 cents a share on 412,500 no par shares of stock, bringing the net profit for the nine months ended Sept. 30 to \$1,291,029, or \$3.13 a share on the stock.